Situations of Strata upon the Brighton Road.

1807. Jno Farey Senr Esqr

1 From Islington to Sutton Common

5 Sutton to Ryegate Hill
Clayton Hill to Preston.

6 Ryegate Hill. Clayton.
Preston to Brighton —

7 Wheesthan. Fire stone pits. Clayton
8 North of Ryegate. N. of Clayton
9 Ryegate. N. of Clayton.
10 Cockshut Hill. Turnpike N. of
Clayton.
11 Do. Do.
12 Turnpike S. of Cockshut Hill.
S of Fryars-oak Inn.
13 Fryars-oak Inn.
14 R. of Mole River to Horse Hill. R of
Fryars oak Inn.
15 (45th Mile Stone Botton of Horse Hill)
16 Bottom of Horse Hill. N. of 45th Stone
17 Rockwood Common 1 Mile. S of St Johns
Common —
18 Rockwood to Crawley. S of St Johns. C
19 S of Crawley. Botton of St Johns Com.
20 S of Crawley Hills. St. Johns Common.
21 Do. —— N of St. Johns Comm.
22 Do —— St. Leonards Forest to
Hampstead Hill. 43rd Mile Stone.
23 Hampstead Hill to N of 43rd Mile Stone
through Cuckfields. also at 32nd Mile.
24 S of Ouse River.
25 Do. Lower Down —

26, 27, 28 } do not crop out any where

for Nos 10 to 17 see Smith's Mem:
VI. 184, near Devizes —

Names of Strata

1 —— London Clay
2 Sand
3 Clay
4 Sand
5 Upper Chalk
6 Lower Chalk
7 Fire Stone
8 Chalk Marble
9 Red Sand
10 Coarse Sand
11 Blue Clay
12 Lead coloured Sand
13 ——
14 Clay
15 Marble
16 Clay
17 Sand
18 Clay
19 Red Potters Clay
20 Ant Hill Clay
21 ——
22 Loam
23 —— Stone
24 Pipe Clay
25 Shaley Loam
26 Stone
27 Clay
28 Sand

DSI

37 Howland Street, 19th May 1822

Dear Sir

Not having yet received a Proof of the Strat. Index to Min. Conch. Vol 3. as I expected ere now (& would have gladly had it, when I was correcting Tillock's proof of the counter-part to the same, on the 13th) I write to inform You, lest the Printer may have neglected to inform You: — it must not be neglected — I have been carefully reading Young & Bird's Work, who I see, make no references to Min. Conch. after tab 215 f 225: — will You or Your Son, give me a line, mentioning any subsequent plate of yours, that describes any others of their Shells, that I may pencil the same, as Syn. into my copy of Min. Conch. Which of their Ammonites, answer to your A. ang. tab 222 f 2, and which, to your A. Leto. t 266.

A friend has sent me Mantell's Book to peruse, which I have partly read, & observe (how agrees with Young's) his high injustice [redacted] to poor Smith, he is sunk, as the Dandys say, by all the Anti-Smithian Association in Bedford Street; I have, however, put their vile attempts on record, & will yet more effectually do so, please God I live; — I am in great haste

Dear Sir Yours very truly

J. Sowerby*

Mr James Sowerby

* may 4 Sons being now dispersed, & no longer my Domestics & no Comm. and Son.

Mr Sowerby

2 Mead Place

Upsglum[?]

Lambeth

2

Berners St

10 o'Clock
20 MY
1822 F.NT

DSI

Measurement of Strata found in Boreing & Sinking the Shaft or eye of a Coal Pitt in Wollaton Estate belonging to the Right Hon.ble Lord Middleton

No. of Strata	Surface Names of Strata	Yds.	Ft.	In.
No. 1	Red Strong Soil	—	1	4
2	Do. Marle & Limestone	1	1	—
3	Lime Stone	1	—	6
4	Lime Stone Skerry	—	2	—
5	Black Bind	1	1	—
6	Grey Clunch	3	—	—
7	Grey Stone	3	—	—
8	Blue Bind	4	1	—
9	Soft Coal	1	—	3
10	White Clunch	—	1	—
11	Black Clunch	—	1	—
12	Smutt or dust Coal	—	1	11
13	Black Clunch	1	1	—
14	White Stone	1	1	—
15	Grey Cank Stone	7	2	—
16	Coal	—	—	6
17	Black Clunch	2	—	—
18	Blue bind	3	—	—
19	Soft Coal	1	—	—
20	Blue Clunch	4	—	6
21	Hard White Stone	4	1	6
22	Grey Clunch	3	1	6
23	Blue Bind	1	—	—
24	Black Shale	—	1	—
25	Coal	—	—	9
26	White Clunch	—	—	9
27	Blue Stone	5	—	—
28	Black Bind	—	2	—
29	Black Shale	1	—	—
30	White Clunch	—	1	—
31	Grey Stone	7	2	—
32	Grey Stone bind	1	—	—
33	Black Shale	—	—	6
34	Coal	—	2	3
35	Black Clunch	1	—	—
36	Mixed Measures	1	2	—
37	Black Shale	—	2	3
38	Iron Stone	1	1	6
39	Coal	1	—	6
40	Grey Clunch	—	1	—
41	Rounds & Bind	3	1	9
42	Roof & Hard Coal	2	1	—
	Depth in Yards	77	—	3 Inches

Below the Coal lys the White Clunch about a foot thick

Coal Pitt Shaft

Shaft or Eye of the Coal Pit about 10 or 12 feet Diameter

& under that is a Grey Rocky Stone of little Value — or Variety and of unknown Deepth —

Near to the above Deepth & descrip=tion lys all the Coal Pits in this Neighbourhood — of Corsar — Trowel — Billberry — & Wollaton & the Deepth of Strata nearly the same — as above Stated —

The above Pit has been above these 10 Months in Boreing & getting down to the Coal —

Which was one Reason that I did not write you sooner — Waiting till the Shaft was finished that I might give you exact dimensions —

Now for the Coal as Pr Specimens sent under Nos

N.o 18 Blue bind

N.o 19 a heavy Sulphury Coal found above the bed of Coal in Various thickness

N.o 20 2 Pieces of light Rotten Coal — found at the top of the bed of Coal —

N.o 21 Middle layer of Coal not so good as the next —

N.o 22 3 Pieces best Bottom Coal that Rises from the Pits —

N.o 23 — 3 Scaly thin Layers found between the Middle & Bottom Coal not good for Burning —

N.o 24 — 2 Pieces of Metalic Mixture found in Corsar Pits about 70 or 80 yds Deep —

N.o 25 Top of Corser Coal Pits neither of them good for Burning —

N.o 26 Rockey Coal from its Metalic can not be used as fuel —

N.o 27 — Slum — or Clunch under the Coal — a thin layer & thin Stone

"In the Summer of 1838, a tall, well grown, fine looking young Gentleman from France, for a very short time became an inmate at my Lodgings, 6 Lancaster Place, Waterloo Bridge, and had not been there more than 3 or 4 days before he said he should like to take my portrait - it would make a good picture - if I would permit. I told him I could not afford to pay for it. 'Oh' said he, "artists are never paid". Consent being given he said "Tomorrow me at 8, you at 10", and accordingly in the morning at 10 I found in my room he had prepared the canvas put on his painters silk gown of all colours, adjusted the lights placed me in one chair and himself in another, set to work without any easel, and by 4 o'clock in the afternoon, with about half an hours retouching the next morning, he produced a fine oil painting.

I never saw a man stick so closely to his work or handle his tools so dextrously. There was no time lost in idle conversation for he could speak but few words of English, and I none of French.

It was thus, by the skill and generosity of my much esteemed young friend M. Fouran, I became possessed of a fine oil painting. He requested me to write on the back of it - Portrait of Dr. William Smith, painted in London, which I did in a strong hand."

Extract from

Mr. Smith's letter from Scarborough.

June 29th. 1839.

27th Nov.r 1816

Dear Sir

as I now find by Letters
from my Friends in Norfolk they
expect me to account to them for the
50 £ note of hand in my Bill
for Business done. I shall be glad
if You will send it to the Bankers
for acceptance and get it discounted
and settle Your Account and let
me have the remainder.

You will be kind enough
to let me know as soon as You can
accomplish these matters —

I am
Dear Sir
Your obliged
Servant
Wm Smith.

15 Buckingham St.

answer 27th Nov. 1816

Dear Sir

Ten days ago I wrote to Mr. Jermyn, and until I hear from him I can do nothing with Mr. Johnsons bill when he writes to me he will gives his directions ~~I shall be happy to dispose of it as he directs~~ for the disposal of it. ~~I should be very glad if you had the whole of it~~. I shall ~~I hope then to be~~ always endeavour to meet your wishes

Mr James Sowerby
2 Mead place

Co Smith 1816

DSI

Sir

Sibton near Yoxford Suffk.

I have been almost perpetually from home since
my Receipt of Smiths second Number — I now enclose
you Mr Johnsons bill upon his Bankers, at two
Months for fifty pounds; for this Sum please you will
Debit No 2 of Smiths "organic Remains be" and return
as much when received, and as received, from the
Sale of it, for Mr Johnson's use.

I should be obliged to you for an acknowledgement
of the Enclosed, and your assent to the proportion
herein mentioned for the Repayment of Mr Johnson.

I remain Sir

Your very Obedt Servt

H. Jermyn

2 Nov: 1816.

P.S. Be so good as to let me know the Values of each of the
Nos 1. & 2. now published and the sums of each succeeding
Number, which I will dispose of if I can, or if I
cannot I will return them.

G
5 NO 5
1816

Jeoney . 1816

Mr J Sowerby

2 Mead place

Lambeth

On Sbeg to say I shall be sorry to have to do with

the plates for another No
for which several sketches
were made and much
time employed and ~~now~~ I am still
~~I am~~ ready to complete
them so soon as certain
drawings which were
referred to you are sent me.
& it was in this way (by the
completion of the Work) that
your late Uncle expected the
account to be settled.

I am dear Sir
your's truly
Copy. H. C. Sowerby

DSi

Septr 26 1839
Camden Town

Dear Sir

Since Mr Lowry applied
for your lamented Uncle's
a/c of Strata I identified
I have in vain sought for
an old ~~account~~ Book which
contains the particulars but
your Uncle had the a/c
and in my ledger of 1836
I find the following statement
made I believe when the

Stock and Copper plates were given up to your Uncle -

Wm Smith with Mr Sowerby

Dr

1832 July 9	Old Book Cash due to Mr Lowndes -	50 . 0 . 0
1836 Septr 19	Cash - - - -	2 . 0 . 0
	Commission £ -	52 - 0 - 0

Cr

Balance (of account for engraving & sale of Copies	36 .. 14 .. 4
	15 - 5 .. 8

The £50 advanced by Mr Lowndes was by an agreement of which I have a copy in Mr Lowndes' possession ~~hands~~ to be retained for the expences of carrying on the work and the receipts and stock to be security for the payment. The Balance was however for some time less than 50£ but notwithstanding I gave up the stock without settling the commission for selling the work and agreed at various times to engrave

Ellingham House
near Bungay

Dear Sir

my good Friend Mr. Jermyn Esq.
of Sibton Abby near Yoxford has just been
here and engaged to forward my second number
of Anglia identified by organized Fossils and
desired me to inform You that he will pay You
50 £ as the expense thereof on the day that the
first Copy of it is delivered to him as above

I hope therefore You will immediately send
the M.S. to press and advertize the publication of
it for the 1st of next Month. I have hung up the
list of subscribers at Norwich and find several
names have been added to it. If You can send
any proofs of the plates &c. directed to me at the
Swan Inn Yoxford so that I can show them to
Mr. Jermyn on Sunday. You will oblige

Dear Sir Your humble Serv.t

Wm Smith

9th Sept. 1816

Dear Sir

I read your this day and send you the rough prints for next Number of Strata you will make that observations you please upon them that they may ~~be~~ accord with your wishes, I am glad for your & the science sake that you have good friends to forward the work I will push the printing that nothing may be wanted and get it ready if possible next month [illegible] according to your desire with best remembrances to Mr Lethbury & all friends I am Sir your very truly

S. Sy

Sir

According with Mr Smith's desire from your interest I have the pleasure of sending the 2d No of his Strata Justified by organized fossils - Took some pains to get it done sooner, but the various persons engaged & often interrupts our desired punctuality I expect the next No will not be so long delayed and am Sir your humble servt S. Sy

Mr. James Sowerby
2 Mead place
Lambeth
London

3.10.0

70
12
105) 840 (8

36
8
288

16.8
7.4
1.4.0

7/13.10.3 (1..18..7¼) ¼

130
126
48
51

19/7
133

1.12..6

1..3.1
3.18.8
5..1..9
9:9

7.6
1.1.10
1.4.9
18.10
1..18.7
5..11..6

1..11..6

14)
13..10..3
1.12..6
3.3.1
..18.2
5..18..8
15.3
1..1..2
..1..5

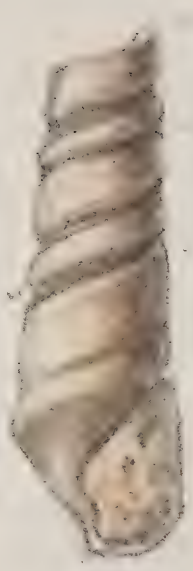
5..
10..6
5..6
3..6
5..0

DSI

Probably drawn by James Sowerby for the plates of Clay over the Upper Oolite, & Fuller's Earth Rock.

JS has drawings for plates of Coral Rag & Pisolite, Kellaways Stone (1 sheet) Clunch Clay & Coral Rag (1 sheet) Coral Rag (1 sheet unfinished) Kimmeridge & Portland Marble (1 sheet) Clay over Upper Oolite FE. Rock & Upper Oolite (in part on 1 sheet)

DSI



Nov: 16. 1816

Copy of a letter addressed to
W. Jerman Esq. Sibton Abbey Le

Sir

I should sooner have acknowledged the receipt of your letter containing an order upon the Bungay Banks for £50- but I hoped before this the business would have been settled without any further trouble by Mr Smith writing to you. I must now observe that instead of £50 in money which I was given to understand I was to receive from you immediately upon the delivery of a copy of the second number of Smith's Strata I have only received an order (not accepted) drawn by Mr Johnson upon the Bungay Banks, not payable till two months after date - Next, I understood that this £50 was to be paid to us to be accounted for to the work & Mr Smith & from a letter which he received from you, that he was to send his receipt for that sum as a part of a larger sum due to him, ~~in which case he would have been entitled to as many copies of the second number as he wanted for his subscribers~~; but you wish me to engage to account for this £50 to Mr Johnson out of the proceeds of this 2 number as it sells, ~~which will make it necessary for Mr Smith still to pay us in money for what copies he may want~~ wherefore, as the terms upon which it is to be paid are so different from what were first proposed, & as I cannot account for any part of the proceeds of the work to any person receiving it, and suppose it will be best to return the draft to you. And I accordingly

* but Mr Lowndes until this £50 be paid

only wait your advice to do so.

DSI

Proposals for prints on
the most instructive
Coloured paper of organic Remains
that indicate the Strata of England
according to Mr. W. Smiths map
with references.

The work to be printed on fine Royal
coloured
paper in 4to, to be published in
numbers of 5 plates each at 7/6
per number & to be completed in
seven numbers

By soon as a sufficient subscription to the amount of £30 shall have been received the numbers will be commenced. The work will be completed

Seven numbers of 5 plates each would cost for 250 copies of each Number £50.. which at 7/6 per copy would amount to £93.. 5, per number & which might be sold to the Trade at £72.. 0.. 8

The whole work would be £2.. 12.. 6 per copy.

In handwriting of Jean Jouvelet

DSI

Sir

I am very sorry for your
disappointment in the favour I
expected of your Company to examine
my Fossils on Tuesday last and if
to-morrow forenoon be convenient
I shall be very glad if you will give
me a call—

I am
Sir
Your humble Ser.t
Wm. Smith—

Saturday
March 12th }

15 Buckingham St
Adelphi—

To Captn Wm Pierce

Sir

I have to thank for sending the petrified stump &c which came safely last week about the time you might have recd a letter from me requesting you to procure a larger stump that stood in the quarry where I was when the men were wedging the block if you recd that letter I will much oblige me by telling if there is any obstacle against complying with my request as I shall hope to remove it so am your &c

J. Sowerby

Mr. Sowerby
no. 2 Mead place
Lambeth —

DSI

J. Sowerby's
colour pattern

3 CLINCH CLAY + SHALE

DS

IN THE PRESS,

AND SPEEDILY WILL BE PUBLISHED, BY SUBSCRIPTION,

BY E. WILLIAMS, 11, STRAND,

In Numbers, Quarto, Price 5s. each,

TO BE PRINTED UNIFORMLY WITH W. SMITH'S GEOLOGICAL WORK, ENTITLED

Strata identified by Organized Fossils,

A

STRATIGRAPHICAL SYSTEM

OF

ORGANIZED FOSSILS,

WITH

NUMEROUS LOCALITIES IN EACH STRATUM.

BY

WILLIAM SMITH,

Civil Engineer and Mineral Surveyor.

THE Arrangement of Organized Fossils, according to the Strata in which they are imbedded, being the most simple and natural, and now generally adopted, it is presumed, that, with the further Arrangement of the Fossils of each of those natural divisions in Classes, Orders, Genera, and Species, according to the most approved Nomenclatures and Systems, this work will be acceptable to the Public.

In the work will be given coloured Tables of the most copious Genera of Organized Fossils, shewing their respective Sites in the Strata, in lines coloured to correspond with W. Smith's Delineation of the Strata on a Map, published by Mr. Cary, Price *5l. 5s.*

The Work is expected to be comprised in 7 or 8 Numbers.

Subscriptions received for this interesting Work at No. 11, *in the Strand, corner of Craven Street.*

November, 1816.

APRIL 16, 1807.

TO BE DISPOSED OF IMMEDIATELY,

AN

EXCELLENT WATERFALL,

AND

SMALL FREEHOLD ESTATE,

IN ONE OF THE

FINEST VALES IN THE VICINITY OF BATH,

SURROUNDED BY

Hanging Woods and Plantations,

THAT RENDER IT TRULY

Picturesque and desirable to Persons of Fortune or Business.

To any gentleman who wishes to devote a small capital to a most profitable concern, which might be worked by machinery, this situation must be very advantageous. Business, pleasure, domestic comforts and œconomy, may here be better united than in any part of the kingdom. The fashionable city of Bath being within two miles, any gentleman wishing to reside there might, from the rich meadows and other land adjoining this waterfall, obtain hay and corn for his horses, and milk, fish, fowls, vegetables, and other necessaries for his establishment, on the most reasonable terms; to which he might also, at a little expence, add all the advantages and comforts of a rural cottage as a summer residence. Near two acres of the land was many years since improved and planted with fruit trees, now in the most thriving state, which, with the fine sheet of clear water, well stocked with trout, and beautifully environed and well sheltered, renders it admirably calculated for the site of a genteel house or ornamental cottage.

To persons solely dependant on business which requires less capital, the above piece of ground may be very profitably employed as a nursery or garden, to raise choice and early vegetables for the Bath market—vegetation here being remarkably early in the spring, and manure obtainable by the canal boats upon the most moderate terms.

This estate has many singular advantages: there is no tythe except an ancient and indisputable modus of 12*s*. 1½*d*. per annum, in lieu of small tithes, poor, church, and road rates—and land-tax very moderate. Building materials, both limestone and freestone, dug on the spot, and also blue marl, and beneath that has been discovered the marks of the blue lias limestone. By comparing this situation with the same strata, which 6 miles to the westward (about Dunkerton, &c.) has been perforated for coal, and by tracing the strata connected therewith, which have been exposed in making the canal between those two places, there are reasonable expectations of finding good coals at a moderate depth beneath the surface of all this land.

The waterfall is remarkably well calculated for a paper-mill, and for working one of the patent paper-making machines, there being several strong springs, and the means of obtaining a considerable quantity of water, even 8 or 10 feet above the level of the pond or main stream; such water might of course be well employed to work the small wheel necessary for moving the paper engine, and be re-used on the main water-wheel. As springs of various sorts of water issue from the rising ground on both sides the valley, the washers may be supplied with running streams, without the expence and incumbrance of the usual pumps and machinery. The fall on the trout stream, which, in a very imperfect state, was many years since employed as a fulling-mill, has been much improved, and the reservoir or mill-pond enlarged from less than a quarter of an acre to more than an acre and a quarter. It is well calculated for an overshot wheel. The fall between head and tail-water being more than 16 feet, but might at a trifling expence be increased to five or six and twenty feet, without risking any material injury from floods or tail-water.

As the stream is supplied from strong springs, issuing from the adjacent very high hills, it is but little affected by the greatest droughts.

If any business established on the waterfall should become so extensive as to require more power than the stream (which is about equal to ten horses), it has the advantage of supplying a steam engine with coals, upon the most moderate terms, by the canal boats daily passing to and from the collieries, which are within the distance of seven miles. The canal which extends from the Somersetshire collieries to the Kennet and Avon canal for half a mile, passes through this land, and that canal, and the Kennet and Avon, may be navigated for twelve miles without a lock. By these two canals, the Wilts and Berks, and other canals and navigable rivers therewith connected, a water communication is established between this situation and the cities of London, Bath, and Bristol, and the great manufacturing towns of Bradford, Trowbridge, Milksham, Devizes, Calne, and Chippenham.

In fact these canals form together a most extensive water conveyance to a large and most populous part of the counties of Somerset, Wilts, Berks and Middlesex, and connected with the Thames and Severn navigations, it gives this site a water communication with South Wales, and all the other numerous canals and navigable ramifications of those two rivers, and of course with Birmingham, and all the inland navigations in the north of England.

Near the fish pond is a new-built cottage, and the first floor of an enlargement, which if completed, would make it a comfortable residence.

The situation must be very desirable to persons in the corn or coal trade, the waterfall being equally applicable to a flour mill, or to the various mechanism employed in manufacture, but particularly to such as require heavy goods by water conveyance.

The whole property, consisting of 24 acres of rich meadow, pasture, and orchard, will be sold together, or the water and a small paddock separately.

For further particulars, or to treat, apply by letter (post-paid) to Mr. WILLIAM SMITH, ENGINEER and MINERALOGIST, Norwich.

Mr. John Smith, Surveyor and Drainer, Broadfield Farm, Mitford, near BATH, *will shew the Premises and a Map of the Estate.*

BACON, PRINTER, NORWICH.

The Work will be comprised in Seven Numbers, Quarto 7s. 6d. each. The first Number will be published on the 1st of May next, containing Four Plates, beautifully engraved by SOWERBY.

The Figures to be printed on coloured paper, accompanied with Letter-press Descriptions of their localities in the Strata. Highly finished Copies 10s. 6d. each Number.

Printed for and sold by the AUTHOR; Mr. SOWERBY, *Mead Place, Lambeth;* LONGMAN and Co. *Paternoster Row;* E. WILLIAMS, 11, *Strand;* and Mr. CARY, Map Engraver, 181, *Strand;* of whom WM. SMITH's Map of the Strata may be had.

WILLIAM SMITH,

Mineral Surveyor,

15, Buckingham Street, York Buildings.

Printed by S. Gosnell, Little Queen Street, London.

GEOLOGY.

THE complete establishment of the science of Geology upon the only true principle, an accurate representation of localities, originating in various accounts of my discoveries many years since freely circulated, and the publication of my large Map of the Strata of England and Wales, have induced me to lay before the Public vouchers of those facts, selected from the most characteristic Organic Remains, by which the Order and Courses of the Strata are readily identified. The Work will be entitled,

BRITISH STRATA

IDENTIFIED

BY THEIR IMBEDDED

ORGANIC REMAINS.

[*Turn over.*

DSI

WILLIAM SMITH AND THE HACKNESS QUARRIES.

BY T. SHEPPARD.

A useful volume containing the whole of the Minutes and copy of correspondence in connexion with the building of the Public Rooms at Hull, one of the larger old buildings which is shortly to be taken over by the Hull Repertory Theatre, is now in the Hull Municipal Museum at Hull. It contains some references to William Smith, the "Father of English Geology," and to Hackness, which provided the building material for the Scarborough and York Museums, and would have provided the stone for the Hull Public Rooms had not the quarry become useless through landslip of the beds above.

In my monograph* on "William Smith: His Maps and Memoirs," I referred to the fact that Sir John Johnstone of Hackness employed William Smith as his Land Steward during the period of this correspondence, and it was during Smith's sojourn in this district that in 1832 he produced the remarkable map of Hackness. The quarry which supplied the stone for the York and Scarborough Museums was, of course, in the well-known Kellaways Rock, and the clay which was above it and caused all the trouble, was the Oxford Clay. With regard to the identity of the quarry mentioned, it will be seen from Plate 17, *loc. cit.*, that there are one or two quarries quite close to Hackness Hall, but probably the one from which this stone was obtained is that referred to as the "Great Quarry" in Smith's Memoir on Hackness Hill, 1829.

The first record in reference to the building is an appeal made by the then Mayor of Hull, in February 1827, calling a public meeting to consider the question. The volume contains a remarkable record of unfortunate delays to the scheme, even the architect having toothache being one of the unexpected items. In August 1827 plans were submitted by the architect, R. H. Sharp, in which he suggested a combination of Roman-cement on brick for the main part of the building, and the cornices, capitals, and bases of stone. In October of the same year, he reports :—

> " I have made enquiries as to the practicability of procuring Hackness Stone for the Building and have some reason to hope it may be had. The great facility with which this Stone is worked will allow of all the ornamental parts being executed in it, at an expense not exceeding that allowed in the estimate for the Stuccos, while its beautiful colour and durability render it a most desirable material for the proposed building."

and later :—

* Sheppard, T., *Proc. Yorks. Geol. Soc,* xix, 1917, p. 75.

"I have written to Sir John Johnstone on the subject of the Stone being allowed to be got on his estate, but have not yet been favoured with a reply.

I have also spoken to Mr. W. V. Vernon, his brother-in-law, and have done everything in my power to represent the matter in as favourable and at the same time, as correct a point of view as possible.

I think the saving by using Hackness Stone would not be less than £500, compared with any other good stone in Yorkshire.

This arises from the facility with which it is wrought. a quality which the Stone unites in an extraordinary degree with great durability."

By April 1828, the architect reports :—

"I would most strongly recommend that the Hackness Stone should be procured without delay not only in order to prevent interruption to the Works but also to allow time for the Stone to harden before it is employed, a precaution rendered highly necessary from its soft nature."

And in May :—

"I am unable to state the terms on which the Hackness Stone is to be had and bearing in mind the rank and liberality of Sir John Johnstone I think it hardly fair to bargain with him per foot at the present state of the business. I understood him distinctly to state that he should be contented with a price which would fairly cover all expenses. The advantages of employing Hackness Stone is not so much in the absolute cheapness of the material as in its facility of working and consequently in the power it gives you of your being able to have an ornamental building at little more expense than by employing the more ordinary sort of Stone you could have a common-place sort of Front.

I venture also to hint that when the Hackness Stone is introduced into the London Market for which Ships have been some time ago taken by myself and others on behalf of Sir John, and which have only been delayed by the state of the superincumbent strata, now chiefly removed, that then any offer made now unless acted on, can hardly be claimed from the proprietor.

The difficulty you speak of might in my opinion be obviated by the Committee's buying immediately of Sir John Johnstone, the stone requisite for the intended building and having it brought to Hull, at their expense and under their management."

On 16th May 1828, the architect wrote to Sir John Johnstone, Bart. as under :—

"I have received a commission to treat with you for the purchase of 800 to 1000 tons of Hackness Stone for the Public Rooms about to be built at Hull. and shall be glad to have the honor of an interview with you at your early convenience.

I learn from Mr. Johnstone that you are expected here to join the Yorkshire Hussars, but as you will then probably be much occupied, I think it best to address you on the subject."

Sir John replied on the 19th :—

"I received this morning your note respecting Stone for the Hull Museum and in expectation of this letter, having some time ago instructed Mr. Smith to calculate the terms upon which it could be supplied. I must refer you to him for the particulars as the Freight from Scarbro to Hull can be managed at an easier rate by the Hull people than myself. I should prefer delivering it on the Pier at Scarbro' at a certain rate. A fair profit upon the Stone to remunerate me for

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the extra expenses incurred upon the roads, &c.. is all I require and as Mr. Smith must be able ere this day to have formed some idea of the necessary expenses of raising it, and has a perfect knowledge of the profit I require upon, I have no doubt but that you will come to terms with him immediately.

How far the supply can be furnished and to what extent during the next 2 months I know not as the York and Scarbro' Museum both require a regular weekly supply, but most probably no difficulty on this head will arise. I shall always be at liberty from one to four during the Yeomanry week."

To this the architect wrote to William Smith at the suggestion of Sir John Johnstone :—

"I think we may fairly take the sizes of stone required to be similar to that furnished for the Yorkshire Museum, for as the Drawings are not yet made it is quite impossible to say exactly what will be wanted.

It will be proper to stipulate the quantity per week to be delivered on the Pier; and it should be clearly understood that in the measurement no broken arrises or corners will be taken, as the loss arising from them is very considerable to the Mason. The total quantity will I think not be less than 1000 tons, it may exceed that."

and the following interesting letter from William Smith was written on May 28th, 1828 :—

"In answer to your favour of the 24th on the subject of Hackness stone I need not say how much I have thought on it as I am anxious to see the stone brought into more general use, especially in Public Buildings which you know so well how to design, and execute. It is rare to find a frustum so well calculated for Gothic or Grecian Architecture and for the massive work of the latter as rare to find a quarry to supply the blocks. Sir John was not at all aware of the size of the blocks required at York as I have heard him say "he should not have engaged to deliver such large stones at that price" we must therefore in our new Contracts have a better price for Stone of the largest size and finest quality of any in the Island.

A stone of 5 tons was last week sent to Scarbro, the block would have made one of the 14/6 stones you have ordered but for want of room in the quarry we were obliged to cut it. There is however plenty of fine stone at hand in the adjoining pillar but Captain Thomas is afraid to risk the loading of those large stones in his small vessel. I therefore expect they must be sent to York on two timber carriages and your Contractor (of course) must pay the extra expense of carriage. These will be more than 7 Tons each but loads of from 3 to 4 tons each daily passing make sad havoc with our roads. To remunerate the extra expense incurred on the roads "and the &c." which includes the extra depth of boring, extra distance of wheeling away the rubbish and the extra expense of removing slips, such as we have not yet scarcely removed, waste in cutting large stones, cranage, &c., and to liquidate even in a small degree, the heavy expense my worthy employer has incurred in opening the quarry the price on the Pier at Scarbro cannot be less than 17/4d per ton of 16 cubic feet which is less than the cost of any of the very inferior stone at the Ports of Selby, Gainsbro, or Goole. The above price I hope you will think very moderate; for as freight to Hull in small vessels has been done at 5/6d we may expect vessels of a Hundred Tons to do it at 5/-, making 22/4d per Ton or only 18d per foot at Hull.

I have no doubt of delivering 50 Tons a week beside the quantity required for York, but the Quantity around the Crane on the Pier during the absence of vessels cannot be more than 30 or 40 Tons. There is now nearly 30 tons which nearly blocks up the Crane.

As to broken arrises and Corners, these are casualties which all stone is liable to, and for which our not over nice measurements will in some degree compensate.

I shall be glad to know as soon as possible in what time the whole quantity will be required, and how much thereof at certain intermediate periods.

I am most respectfully, Dear Sir, Your Obedient Servant, William Smith."

Evidently Mr. John Broadley, the Secretary of the Hull Public Rooms, realized the value of Smith's communications, as he obtained his directors' special permission to keep the Smith correspondence in his private possession, although copies were entered in the Minute Book. I have endeavoured to find the whereabouts of these letters through the solicitors who had Mr. Broadley's affairs in hand, and other sources, but so far have failed.

The architect wrote to Mr. Broadley on May 29th as under :—

"I have today seen Sir John Johnstone, and have agreed with him for the stone at the price mentioned in the letter from Mr. Smith (who is the eminent geologist), subject of course to your approval a Cargo of 50 Tons to be sent forthwith and the rest as speedily as possible."

Correspondence then occurred as to the best method of conveying the stone from Scarborough to Hull, arrangements having had to be made with the Scarborough Pier, and the Hull Dock Company, and eventually it was decided that special sloops should be employed to bring the material. In June 1828 an order was given for 50 tons of Hackness Stone to be delivered immediately.

In a general report on the progress of the Public Rooms Scheme, the following is included :—

"The Committee after some correspondence judged it advisable on several grounds to enter into a contract for the quantity of stone which may be required. The quarries at Hackness afford an Oolitic stone, of a free and beautiful texture, similar in quality to the well-known Bath Stone capable of being easily worked, and improving on exposure to the air. This stone is at present employed in the erection of the Museums at York and Scarborough, from which latter place it can be easily obtained by water carriage and from the liberal conduct of the proprietor Sir John Johnstone, Bart., who, in consideration of the object, has fixed no more than a remunerating price for the labour and expenses, the Committee have been enabled to procure this valuable material so essential to beauty of architecture at a cost but little greater than that of stock brick, and not exceeding that of other stone and Roman cement, with which it had been intended to face the building."

On July 7th, 1828, the architect sent the following letter to William Smith :—

"By this time I presume that you will be able to furnish a cargo of stone for the Hull Rooms but as in the present state of the business it is not possible to give you the exact dimensions of the stones required. You will be so good as send blocks of 3 to 6 or 7 feet long by 2 to 3 broad and from 18 inches upwards in thickness. As soon as you can ascertain that 50 tons will be ready for delivery please to write to that effect to John Broadley, Esqre., South Ella, near Hull, who will provide a vessel to carry it to Hull. Pray send only the best quality."

And on the 25th of that month Sir John Johnstone wrote to the architect as follows :—

"I have perused the correspondence between Mr Smith and yourself and am ready to allow that a bargain has been made for Stone at 17/4d per ton of 16 cubic feet at the *average sizes* of the stones employed in the Yorkshire Museum provided the period for delivery (not yet specified) be such as we can comply with, and on this latter point I dare say you will very easily agree with Mr. Smith.

We already have an understanding upon what is most material to us in the transaction that one cargo only, shall be sent to Hull this Autumn in order that nothing may interfere with the regular supply of stone for York, which I am more anxious to advance than retard. But at the conclusion of the York contract which will probably be about Xmas, Stone can be supplied to Hull as it has been to York in the same quantities and with the same regularity. The above has reference to average sized blocks only, if larger are required an extra price will have to be paid commensurate with the risk & difficulty of shipping them and Mr. Smith will be happy to arrange this either with yourself or Mr. Broadley."

The transaction, however, came to an end rather abruptly, as will be seen from the letter dated May 15th, 1829 :—

"I am sorry to say that the Frost, Snow, and Rain in the winter caused the clay in the steep hill above the Hackness quarry to slide into it to such an extent as to choke it up. No stone has been gotten therefrom since the beginning of February and now the Mud is become hard enough to see the extent of the damage done to the subterraneous works there appears to be no prospect of re-opening the Quarry so as to get stone for sale."

As a result the Hackness stone was not used at Hull, and the building, which is shortly to be demolished, was made of brick covered with stucco.

BATH ROYAL LITERARY AND SCIENTIFIC INSTITUTION.

ADDRESS

Delivered on JULY 10th, 1926,

BY

F. A. BATHER, D.Sc., F.R.S.,

President of the Geological Society, Keeper of Geology in the British Museum,

ON

WILLIAM SMITH

"The Father of English Geology."

BATH:

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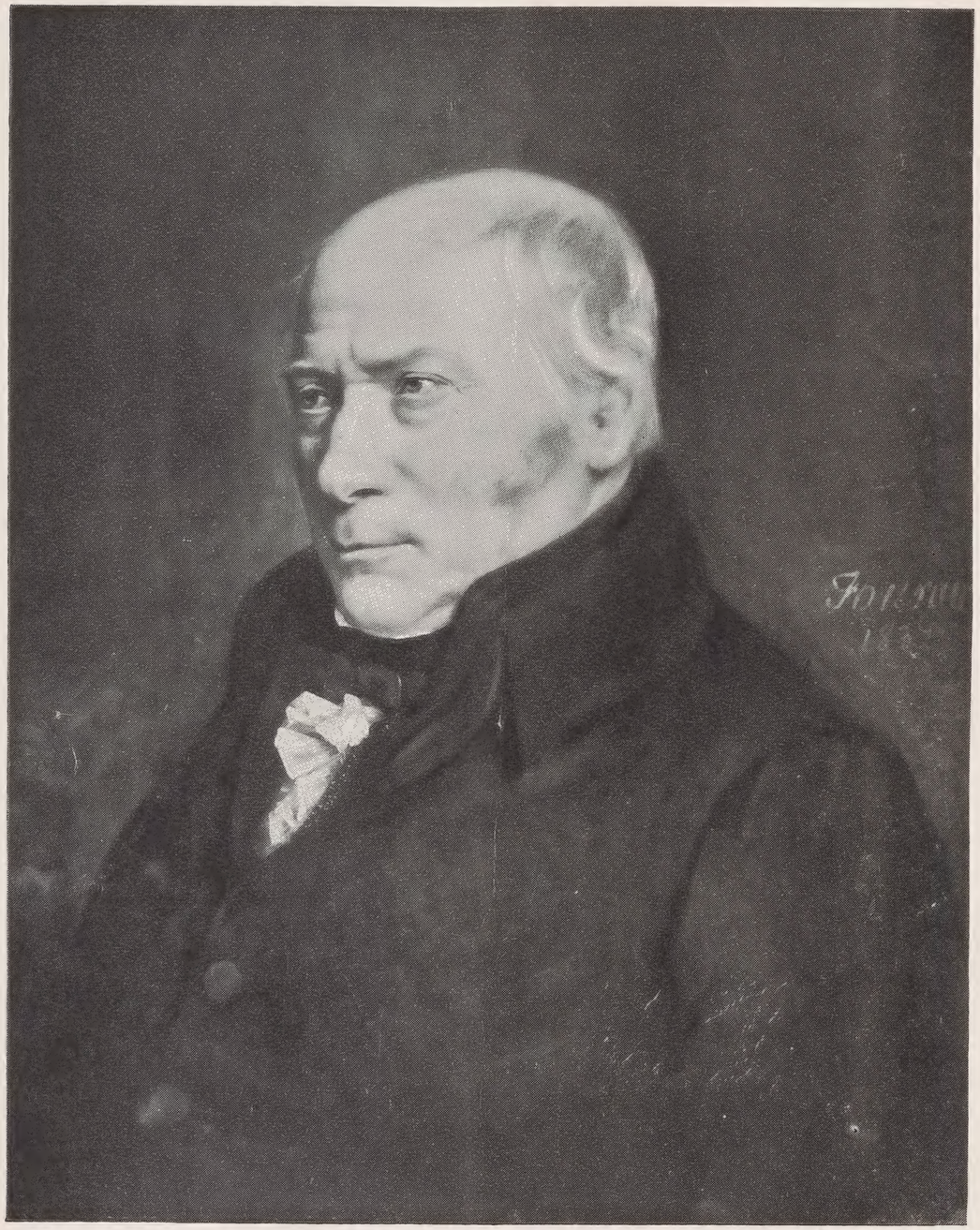

WILLIAM SMITH

From the portrait belonging to the Geological Society of London.
By permission of the President and Council.

Address at Bath on 10th July, 1926

after unveiling a Memorial Tablet to

WILLIAM SMITH

By Dr. F. A. BATHER, F.R.S.,
President of the Geological Society of London, and Keeper of Geology in the British Museum.

We are met here to-day to do honour to William Smith. That William Smith is deserving of honour will be granted; but why particularly in Bath? He was neither a native nor, I understand, a citizen of Bath. There is some doubt whether he ever lived within the city boundaries, and the house that bears the memorial unveiled this morning was the house only of his friend. It was suggested in 1869, the centenary of his birth, that a tablet should be placed on the walls of this Institution, but the scheme fell through. A Committee, appointed during the meeting of the British Association at Bath in 1888, after seeking in vain for a house in Bath, affixed a tablet to the wall of the Tucking Mill at Midford, where Smith lived while superintending the work on the adjoining canal.

But Bath, if not the bodily home of William Smith, may be considered, in Lord Haldane's phrase, his spiritual home, and it may be interesting to realise the connection.

First let me re-capitulate some bald facts.

In 1795, William Smith, then aged 26, lodged in Cottage Crescent, south of the city, in order to direct the operations on the Somerset Coal Canal. In examining the district between High Littleton and Bath, he had already noted the regular succession of the strata. A tour through England with two members of the Canal Company had enabled him to extend this observation. The actual levelling and excavation of the Canal revealed the dip of the strata, and yielded fossils by which he learned to identify them. In March, 1798 he purchased an estate on the banks of the canal in a valley three miles from Bath, but during 1799, the last year of the work, he lived chiefly at Midford. Here he coloured geologically the "Map of Five Miles round the

City of Bath," which he afterwards presented to the Geological Society. It is the oldest geological map in existence. Here too he coloured a small-scale map of England, also presented to the Geological Society; and from Midford in 1800 he dated his prospectus of the large geological map, ultimately issued in 1815, and in 1801 his prospectus of a work on the Strata, which never appeared in the proposed form. He must have left Midford soon after, for in 1802 he rented a house in Trim Bridge, Bath, for the reception of his fossils, if not of himself. Finally it was in 1799 that Smith made known his views to the Revd. Benjamin Richardson, rector of Farleigh Hungerford, by whom they were communicated to the Revd. Joseph Townsend. They checked the truth of the statements by a visit to Dundry, and after that it was that the event occurred at 29 Great Pulteney Street which we commemorated this morning. Professor John Phillips, the nephew of Wm. Smith, thus described it (1844, Memoirs of W. Smith, p. 29):—"after dining together at the house of the Rev. Joseph Townsend, it was proposed . . . . that a tabular view of the main features of the subject, as it had been expounded by Mr. Smith, and verified and enriched by their joint labours, should be drawn up in writing. Richardson held the pen and wrote down, from Smith's dictation, the different strata according to their order of succession in descending order, commencing with the Chalk, and numbered, in continuous series, down to the coal, below which the strata were not sufficiently determined."

These facts are warrant for our action. But let us consider why these epoch-making events should have occurred in the fashionable city of Bath. The Revd. Joseph Townsend wrote in 1812 ("Character of Moses"): "Of all the countries with which I am acquainted, no one is so interesting to the geologist as the vicinity of Bath, because in no other are so many strata exposed to view. Neither is there any other country enriched with such a number and variety of *springs* . . . . This it is which makes Bath an excellent school for civil engineers, and I may add, for lawyers; if the former wish to discover hidden supplies of water, and the latter would qualify themselves to settle the numerous disputes which either now subsist or may arise respecting *springs*."

To this audience I need not elaborate the physical circumstances that favour the student of geology in Bath: besides the water supply, hot and cold, the steep cliffs and hill sides with their quarries of building stone, the neigh-

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"CAUGHT IN THE ACT."

bouring coal-measures and the canals. It is, however, important in the present connection to remember that within easy riding distance are outcrops of the stratified rocks from Silurian to Upper Cretaceous, those to the east displaying a regular and obvious succession, those to the west disturbed by unconformities and faults.

The ideas which Smith in his practical daily task deduced from this combination of facts found in the society of Bath a fertile soil. Already the numerous fossils had attracted collectors and describers. In 1779 there were published by S. Hazard of Bath "Descriptions and figures of Petrifactions found in the Quarries, Gravel-Pits, etc., near Bath. Collected and drawn by John Walcott Esq.," and excellent figures they were. The Revd. Benjamin Richardson, who first met Smith at the meeting of the Bath Agricultural Society in 1799, was as well known for the generosity with which he placed his fossils in the hands of those who could best use them as he was for the zeal with which he collected them. He presented many to this Institution. He is said by Townsend to have been the discoverer of the Bradford or Pear Encrinite, at Burfield, but Walcott had already figured fragments of it. Richardson with his collection was well fitted to appreciate the order into which William Smith arranged it, and he speedily introduced him to the learned Joseph Townsend. A remarkable man that; six foot six in his socks, with a voice to match, he had as an open-air Calvinistic preacher been a terror to the damned. To the cure of souls he added that of bodies, publishing a "Physician's Vade-Mecum." It was "A Journey through Spain" that established his well-deserved literary reputation. I have had the pleasure of describing an unique Crinoid which he brought back from there, and have just returned from following his tracks in search of further specimens. He set himself the task of defending the Mosaic account of the Deluge, and at any rate succeeded in publishing a vast accumulation of geological observations from many parts of the world and notably from Bath.

There were other early geologists and collectors; but since they had not much to do with William Smith, I can give them but scant notice now.

The Rev. John Josias Conybeare (1779-1824), grandson of a Bishop of Bristol, and vicar of Batheaston, was best known as an Anglo-Saxon scholar, but he communicated four short papers to the Geological Society.

His younger brother, William Daniel Conybeare

(1787-1857), Dean of Llandaff, was, with De la Beche, the author of a geological Map of the country twenty-four miles round Bath (1823). In the "Outlines of the Geology of England and Wales," written in collaboration with W. Phillips, he paid a high tribute to William Smith.

Among the old Bath collectors was a Colonel Birch. His collection, which contained many reptiles and crinoids obtained by Mary Anning from the Lias near Lyme Regis, was sold by Bullock in 1820.

William Lonsdale, who was born at Bath in September 1794, after leaving the Army, became interested in geology from overhearing two ladies in the library at Bath talking about a fossil found near by. You of the Bath Literary and Scientific Institution know him as the founder of your geological museum and its first honorary curator. We of the Geological Society cherish his memory as that of our curator, librarian, assistant secretary, and editor from 1829 to 1842. Geologists at large know him best as a keen student of fossil corals and the founder of the Devonian System. The two go together. It was his recognition of the zoological position of the fossils, intermediate between those of the Silurian and Carboniferous Epochs, that led him to correlate the limestones of South Devon with the Old Red Sandstone. Thus did he apply the principles of William Smith. He died at Bristol in 1871.

Samuel Peace Pratt (1789-1863) lived in Bath from 1823 to 1839, and he endears himself to me because in 1828 he presented the British Museum with a specimen of the Lansdown Encrinite, described by J. E. Gray as *Apiocrinites pratti*. No figure was given, and for thirty-five years I hunted for the type-specimen. At last some unpublished plates of Gray's "Spicilegia Zoologica," since issued by Messrs. Janson, enabled me to identify it and publish a full description.

It is not possible to give now a complete list of Bath geologists down to to-day. I should however, be ungrateful did I not mention W. Stephen Mitchell, to whose "Notes on Early Geologists connected with the neighbourhood of Bath" (1872. *Proc. Bath Nat. Hist. F.C.* II, pp. 303-342) I am much indebted. By-the-way I possess Mitchell's copy of Townsend's "Character of Moses." He was an assistant in the Library of the Geological Society from 1867 to 1869. We must all regret that he did not live to publish the complete account of William Smith for which he had collected fresh materials.

There are two other names that call for mention at

this time and in this place. Charles Moore (1814-1881) so long identified with this city, of which he became an alderman, is distinguished as the discoverer of Rhaetic beds in this country and of the oldest undoubted Mammal—*Microlestes*. The teeth of this little creature he obtained, with other Rhaetic fossils, by patiently washing the contents of a fissure in the Carboniferous Limestone at Holwell near Frome. It is Moore's name that first springs to the lips of any geologist to whom one mentions this Institution. He may be regarded as the second founder of your museum, and thanks to him, no museum in England, outside London, contains more valuable material. We believe that the citizens of Bath realize their privileges in this respect, and their duties.

In preserving your important collections and in arousing the interest of his fellow-citizens therein, no man did more than our old friend Henry Hoyte Winwood, who died in Bath on Christmas Day, 1920, ten days after completing his 90th year. For 20 years in all he was a valued member of the Council of the Geological Society. In his unwearied readiness for service without reward I rejoice to recognise in Winwood a true Wykhamist.

These are some of the names that come to mind when we read Swinburne's beautiful Ballad of Bath—

> "Loved of men beloved of us, souls that fame inspheres,
> All thine air hath music for him who dreams and hears."

To all these men you in Bath and we who come from outside owe much. Let us now consider what we owe to William Smith.

Possibly we owe to him the fact that Bath still persists. In 1810 the city was threatened with ruin by the loss of its very life blood. The hot springs had failed. Smith was called in, and after much argument obtained permission to open up the hot-bath spring to the bottom. Thus he found, as he anticipated, that the waters had flowed away into new channels. By stopping these, the water was restored and the baths filled in less time than formerly.

This was but one instance of deduction from his theory of springs, which he based upon his practical knowledge of the strata and their arrangement. This was also applied by him to improved methods of underground drainage and surface irrigation, a procedure of the utmost value in agriculture; to the draining of mines; and to the provision of water for canals, towns, and manufactures.

Similarly, by studying and following the operations of nature, he introduced new and successful methods of

reclaiming and preserving land from the sea on the east coast.

If we cannot claim for William Smith the invention of geological maps, we must at any rate realise that his map of the geology round Bath, drawn and coloured in 1799, was the first, and for some years remained the only map in which the outcrops of the rocks were defined, and the succession of the strata correctly indicated.

Similarly the strata must have received some names, whoever described them. But it is William Smith and his Tabular View of the Order of the Strata, drawn up in plain English with the homely terms of miners and quarrymen, that the scientific world has to thank for a series of short simple words, as Chalk, Forest Marble, Fuller's Earth, Blue Lias and White Lias, in place of those sesquipedalian names of Greek and Latin origin which a more academic writer would have felt obliged to invent. This tabular statement, the writing of which at 29 Great Pulteney Street we have commemorated this morning, was not printed and sold, but it was copied over and over again and distributed freely to remote parts of the world.

Sir Archibald Geikie (1905, Founders of Geology, Ed. 2, p. 407) alluding to the haphazard way in which "the curiously mongrel terminology" of the stratified rocks thus sprang up, defends it on the ground of its historic interest and hopes that it will never be supplanted by a more harmonious and systematic terminology. We must, however, remember that the word Gault, for example, means a particular clay found in England below the Chalk. To apply this name elsewhere either to a rock of the same age but different character, or to a rock of the same character but different age, is to breed confusion. Again and again it must be hammered into the minds of geologists that two distinct sets of names are required: the one consisting of local names for local rocks, the other of universal names, not for rocks, but for periods of time. Thus is constructed a time-scale against which the various local rocks can be placed. In Sussex, for example, we have the Chalk-with-Flints; but in Westphalia the rock of the same age is a yellowish marly sandstone, which it would be ridiculous to call Chalk. Both of these correspond to that time-period which is termed Senonian.

How do we know, you may ask, that these very different rocks are of the same period? The answer is: because they contain the same fossils. And that brings us back to William Smith, and the most important of the lessons that he taught.

William Smith was a man of many interests but of one idea. That idea was implicit in the Tabular Statement of 1799 and explicit in the titles of the two works that he published in 1816, 1817: "Strata identified by Organized Fossils" and "Stratigraphical system of Organized Fossils, with reference to the specimens of the original Geological Collection in the British Museum: explaining their state of preservation and their use in identifying the British Strata."

You need hardly be reminded that by "Organized Fossils" is meant Fossil Organisms, as opposed to Minerals, Ores, and similar unorganized bodies dug out of the rocks. In other words Wm. Smith was dealing with the remains or traces of the remains of animals and plants buried by natural causes in the rocks.

Such fossils were well known before the time of William Smith. Large collections of them had been accumulated. The arrangement of certain rocks in layers or strata, with a definite succession within limited areas, had also been recognised. Wm. Smith's merit was thus clearly and succinctly stated by James Parkinson (1811, *Trans. Geol. Soc.*, I, p. 325). It was Smith, he says "who first noticed *that certain fossils are peculiar to, and are only found lodged in, particular strata*; and who first ascertained the constancy in *the order of superposition*, and *the continuity of the strata of this island.*"

This idea is undoubtedly one of the most fruitful in consequences to both Geology and Biology that had up till then been produced. It deserves a little analysis.

First, we note that only certain fossils are restricted in their range. Some may pass from one stratum to another. This makes little difference to the application of the principle, for it was soon recognised that strata must be judged rather by the assemblage of species contained in each than by any particular one, which might be absent in any locality, or might prove to have a longer range than at first supposed. Cuvier and Alexandre Brongniart, whose independent researches in the Paris Basin led them somewhat later to similar conclusions, put this very clearly: "The characteristic fossils of one bed become less abundant in the bed above and disappear altogether in the others, or are gradually replaced by new fossils, which had not previously appeared" (1808, *Journ. des Mines*, XXIII, p. 436).

Secondly, the constancy of superposition is most important because it implies a regular succession, and thus introduces the idea of relative time. It is this which lies

at the base of all historical geology and of all philosophical palaeontology. It is only by the acceptance of this premiss that any proof of evolution is possible. William Smith and Cuvier were not evolutionists in the modern acceptation of the term, but without the combined palaeontological and stratigraphical work which they initiated evolution would have remained what it then was—an ineffective dream.

Lastly, take the continuity of the strata. This does not mean that any particular bed can be traced all the way from, shall we say, Whitby to Lyme Regis without a break. That is palpably not the case, for there are valleys and faults, cloaks of drift or walls of eruptive rock, which intervene. What it means is that the identity of fossils enables the geologist to correlate the beds on one side of a gap with those on the other, and so to infer a theoretical continuity. There is no need to restrict the inference to "this island" as Parkinson does. The rocks on the two sides of the Channel can be correlated as readily as those north and south of the Weald, and we are led to understand that some of Mr. Richardson's foreign correspondents had already applied Smith's scheme to the succession in their own countries. This conception of an original continuity, subsequently disturbed by geological accidents, forms, as Smith himself fully recognised, the foundation of all structural and tectonic geology. The modern theories of mountain-building with their foldings, their overthrusts, their transport of vast sheets of rock, all start from the belief that the strata were once continuous and horizontal.

How simple, how elementary these ideas of the young surveyor seem to us now! It is hard to realise that they came as a revelation to such excellent and well-read naturalists as Richardson and Townsend, and that they were beyond the comprehension of many others to whom their originator looked for support.

Simple and elementary though these ideas have become, the published work based on them would fill a large library, and they are still yielding fruit.

Parkinson, as we note, even before Cuvier and Brongniart, had applied them to the Tertiary rocks of the London Basin, thus extending the Table of Strata upwards. It was not long before a yet more notable extension downwards was effected by application of the same principles.

The observations of William Smith stopped at the Carboniferous. His journeyings had not brought him into close touch with the older rocks, which still lay in the limbo called Greywacke.

In 1826, Smith then in his 59th year, was visited at Scarborough by a man of 35 who had taken to Geology five years previously. Up and down the coast, on foot and by boat, they went, Smith teaching the younger man the succession of the oolitic rocks, and how to recognise them by their fossils. The pupil was Roderick Murchison, who in 1831, when the Geological Society awarded the first Wollaston Medal to Wm. Smith, set out to apply Smith's methods to the "interminable greywacke" of the Welsh border. His conquest by these means of the great kingdom of Siluria is known to you all.

Mention of Siluria reminds one of Charles Lapworth, who by carefully collecting and studying a particular group of widely distributed fossils—the graptolites—worked out the succession of the Lower Palaeozoic rocks in the Moffat area of Scotland. The true importance of this work lay in its application of Wm. Smith's methods in much finer detail to a series of rocks that had undergone an amount of overfolding and faulting far greater than any series previously studied by this means. It was the intensive study of a single group of rapidly evolving auimals combined with minute mapping that enabled Lapworth to unravel the complicated structure. He carried his work on to the yet more complicated district of Girvan, and finally from his experience in applying these principles forged the key that unlocked the Secret of the Highlands.

The world-wide influence of Lapworth was no less than that of William Smith himself, and this was largely because his interpretations were, like those of Smith, always based on abundance of solid observations and never out-ran the facts. But what I wish to emphasize is that this work was but the logical carrying out of Smith's own principles. The new term zonal palaeontology really covered no novelty other than a more general recognition of the truth that strata, however minutely subdivided, must be identified by their fossils. Physical conditions with their lithological consequences repeat themselves over and over again in the record of the rocks, but the great stream of life from its first manifestations to the unseen future is ever advancing in new ripples and rhythms of change. Some field-geologists have talked, perhaps some talk still, of "the tyranny of palaeontology." Some slug-a-beds no doubt grumble at "the tyranny of sunrise." Here to-day we can put forward the counter-claim, advanced by Lapworth in 1899, that "zonal work is probably destined to effect in the history of geological research a revolution as great and an advance as

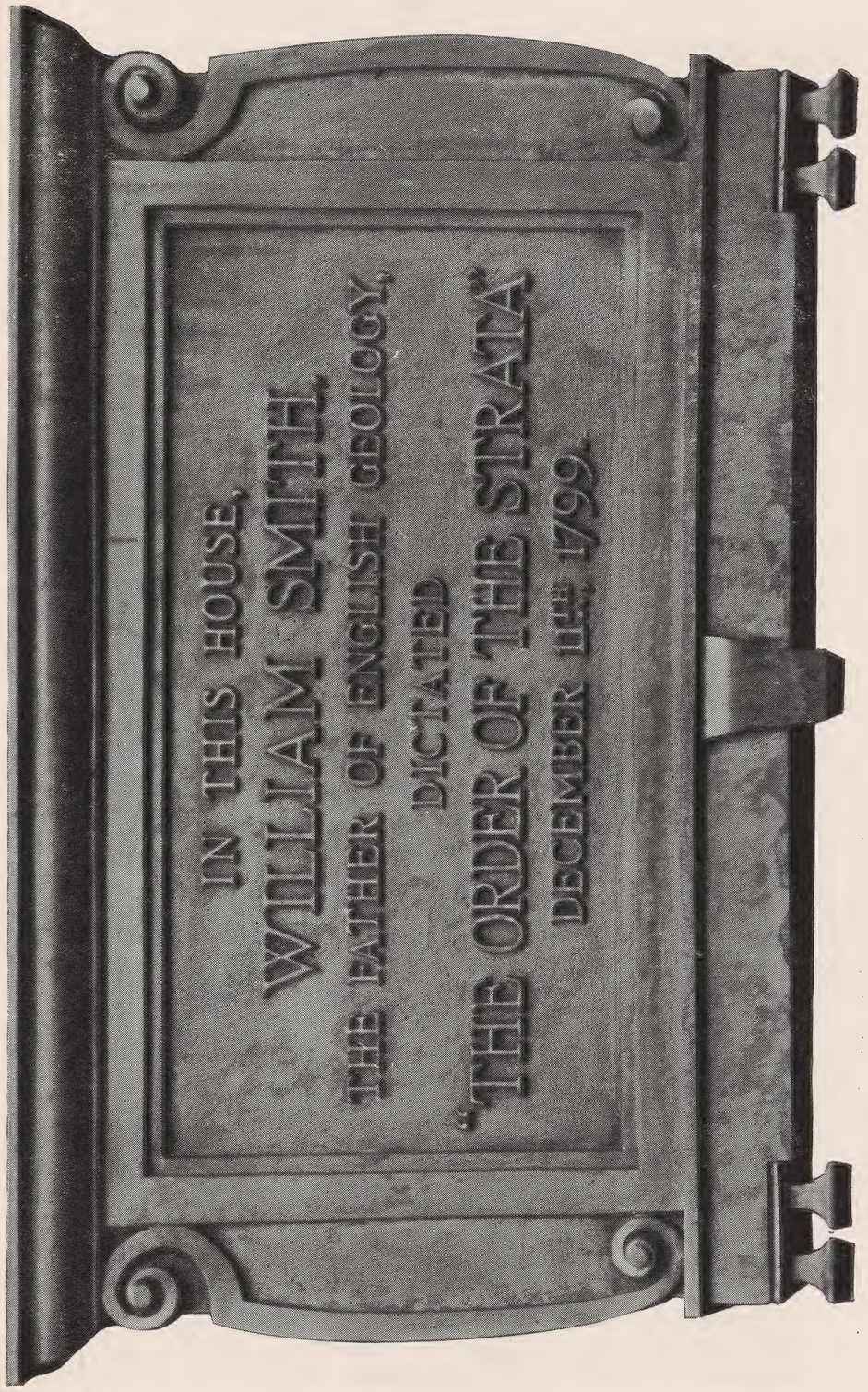
rapid as those brought about by the use of the microscope in the history of biology."

The comparison is apt. Let us return to the Jurassic rocks where William Smith, by what we may term naked-eye observation, first noted an orderly succession. The next great step in their study was their division into zones according to the Ammonites. Here we honour Dr. Thomas Wright of Cheltenham, who, to carry on the metaphor, thus introduced lens and scalpel. The compound microscope with ever-increased powers of magnification and resolution has been applied to these same fossils and their zones by another Cotswold geologist, Sydney Savory Buckman. It is not everyone who can appreciate the minute discrimination of genus and species on the one hand, of subzone and hemera on the other, the tracing of lines of descent, the recognition of discordances, of pene-contemporaneous erosion, and of long discontinuities in deposition. Mr. Buckman, like all pioneers, has had to fight hard for recognition, and his views are the subject of controversy in all lands. But, without saying that Mr. Buckman is such a fool as to be infallible, I would point out that his methods also are merely the logical application of those initiated by the Bath surveyor, and were William Smith present with us to-day he would, I am sure, be first in sympathetic comprehension of his disciple.

There are others I might have mentioned had time allowed, but even shortness of time must not preclude mention of the brilliant and regretted Arthur Vaughan, who so boldly set out to zone the Carboniferous, and whose enthusiasm forced the standard of the Avon section on the rest of Britain. Let me, however, point out that by selecting his characteristic fossils from diverse zoological groups, Vaughan receded, at least in appearance, from the more advanced position based on the progressive evolution of a single group of animals or plants. It is on this platform that we now stand and meditate fresh conquests.

We have advanced far since that day 127 years ago when William Smith dictated his Order of Strata. We are advancing still, and who can foresee to what triumphs we may not be led? There are just two points I wish to make. First, the extreme practical value of these researches. Secondly, their dependence on work that appears to be as far removed as possible from mundane affairs, the work of the pure systematist in palaeontology.

As for the practical value. Smith was a practical man; as surveyor, water-finder, bog-drainer, mining-



engineer, his services were in constant request from one part of England to the other. Even Russia offered him a post. But though his contemporaries might laugh at the whimsies of old Strata Smith, he knew and we know that his geological theories were the guide to all his practical success.

So it is to-day. The two most important industries connected with the earth's crust are coal mining and oil-getting. I was struck during and at the close of the war by the number of young American oil geologists who came to study at the British Museum. What did they study? Fossils, and among fossils such minute forms as the Ostracoda and the Foraminifera. You see, when one sinks a boring to search for oil, the small cores do not contain many large fossils, so it is necessary to make what one can of the small ones. We used to think that the species of Foraminifera had undergone so little change, had so long a range, that they were of little use for distinguishing minor horizons. Necessity compelled more careful study, and behold! it is found that there are after all distinctions between these tiny shells according to their horizon in the rocks. The horizons thus being precisely determined, sections of the strata can be drawn, and the possibilities of striking oil estimated with considerable exactness. Every great oil company of course employs a large staff of field-geologists, but their results need to be carried further by study of the fossils, and this can only be done by experts with the resources and experience of a large museum at their command.

Here and now perhaps we are more interested in the winning of coal. Our coal-proprietors and mine managers are, I believe, by this time thoroughly convinced of the importance of palaeontology. I need only remind you of the work of James McMurtrie of Radstock and David Davies of Gilfach Goch. But I think it would do them all good to read an address recently delivered to the Mining Engineers of Liège by my revered friend Professor Charles Barrois. He set forth therein the work accomplished in the Coal Museum at Lille. The general methods apply equally to this country, for the succession of floras throughout the Coal-Measures is the same in England as in France, Belgium, and Germany. The Coal Measures consist not only of plant-bearing beds, the product of swamps and marshes, but also of freshwater deposits containing the remains of freshwater shells, crustacea, and other organisms, as well as of rocks laid down in the sea and yielding marine

fossils. These three types of rock succeed each other repeatedly, so that a knowledge of each group of fossils is needed: the establishment of one succession controls that of the others. There are three lines of argument, which must agree. The study of these fossils can only be profitable if their precise provenance is known. We have therefore to interest not merely the managers but the actual coal-getters.

The practical value of this work increases with its completeness. There is no surer method of determining the succession and arrangement of the beds, on which sections can be based, and eventually the structure of the neighbouring country inferred. All this, on which the prosperity not of a class, not of an industry but of a nation depends, rests on the refined studies of our palaeobotanists and palaeontologists: men such as—to mention only the dead—Robert Kidston and Wheelton Hind.

To return to the true begetter of all this work, to the Father of English Geology, let me end by saying in the words of Adam Sedgwick when he announced the award of the first Wollaston Medal: "If we, by our united efforts, are chiseling the ornaments, and slowly raising up the pinnacles of one of the temples of Nature, it was he that gave the plan, and laid the foundations, and erected a portion of the solid walls, by the unassisted labour of his hands."

The portrait of William Smith, reproduced as frontispiece by kind permission of the Council of the Geological Society of London, is that which hangs over the presidential chair in the meeting-room of that society. The following account of its painting, written by Smith himself, is taken from J. Phillips' "Memoirs of William Smith" (1844, p. 125).

> "In the summer 1838, a tall, well-grown, fine-looking young gentleman from France, for a very short time became an inmate at my lodgings, 6 Lancaster-place, Waterloo-bridge, and had not been there more than three or four days before he said he 'should like to take my portrait—it would make a good picture—if I would permit.' I told him I could not afford to pay for it. 'Oh,' says he, 'artists are never paid.' Consent being given, he said, 'To-morrow me at 8, you at 10;' and accordingly in the morning at 10 I found in my room he had prepared the canvas, put on his painter's silk gown of all colours, adjusted the lights, placed me in one chair and himself in another, set to work, without any easel, and by 4 o'clock in the afternoon, with about half-an-hour's retouching the next morning, he produced a fine oil painting.
>
> "I never saw a man stick so closely to his task or handle his tools so dextrously. There was no time lost in idle conversation, for he could speak but few words of English, and I none of French.
>
> "It was thus, by the skill and generosity of my much-esteemed young friend M. Fourau, I became possessed of a fine oil painting. He requested me to write on the back of it—*Portrait of Dr. William Smith, painted in London*, which I did in a strong hand."

The artist, Hugues Fourau, was born in Paris in 1803, and was therefore aged 35 when he painted this picture. He studied under Guérin and Baron Gros, and was awarded a medal by the Ecole des Beaux-arts in 1830. Though possessed of a skilled technique and unusual facility of composition, he lacked that depth of thought and feeling which would have placed him in the front rank. Attempting every style, he produced a masterpiece in none. His large biblical, mythological, and battle pieces are happily forgotten. From his earlier period the best known work is the picture of the Dying Chatterton (1844). Of later years he produced several portraits of natural size, among his subjects being Alfred de Vigny (1857). His last known painting dates from 1864.

The copy of the Table of Strata reproduced in our Plate was presented to the Geological Society of London by William Smith himself. The Table is printed on p. 30 of John Phillips' "Memoirs of William Smith" (1844), under the heading "No. I.—Order of the STRATA and their imbedded ORGANIC REMAINS, in the vicinity of BATH; examined and proved prior to 1799."

In the original, entry No. 11, now obscured by folding, runs thus—"| 11 Bastard ditto and Sundries | 80 | . . . . . | Striated cardia, mytilites, anomiae, pundibs and duck-muscles | . . . . . |"

The contemporary geological map of the district near Bath, with many other interesting sections and documents, has been reproduced in Mr. Thomas Sheppard's valuable account of "William Smith: his Maps and Memoirs." (March, 1917, *Proc. Yorkshire Geol. Soc.*, N.S. vol. XIX., Part III.).

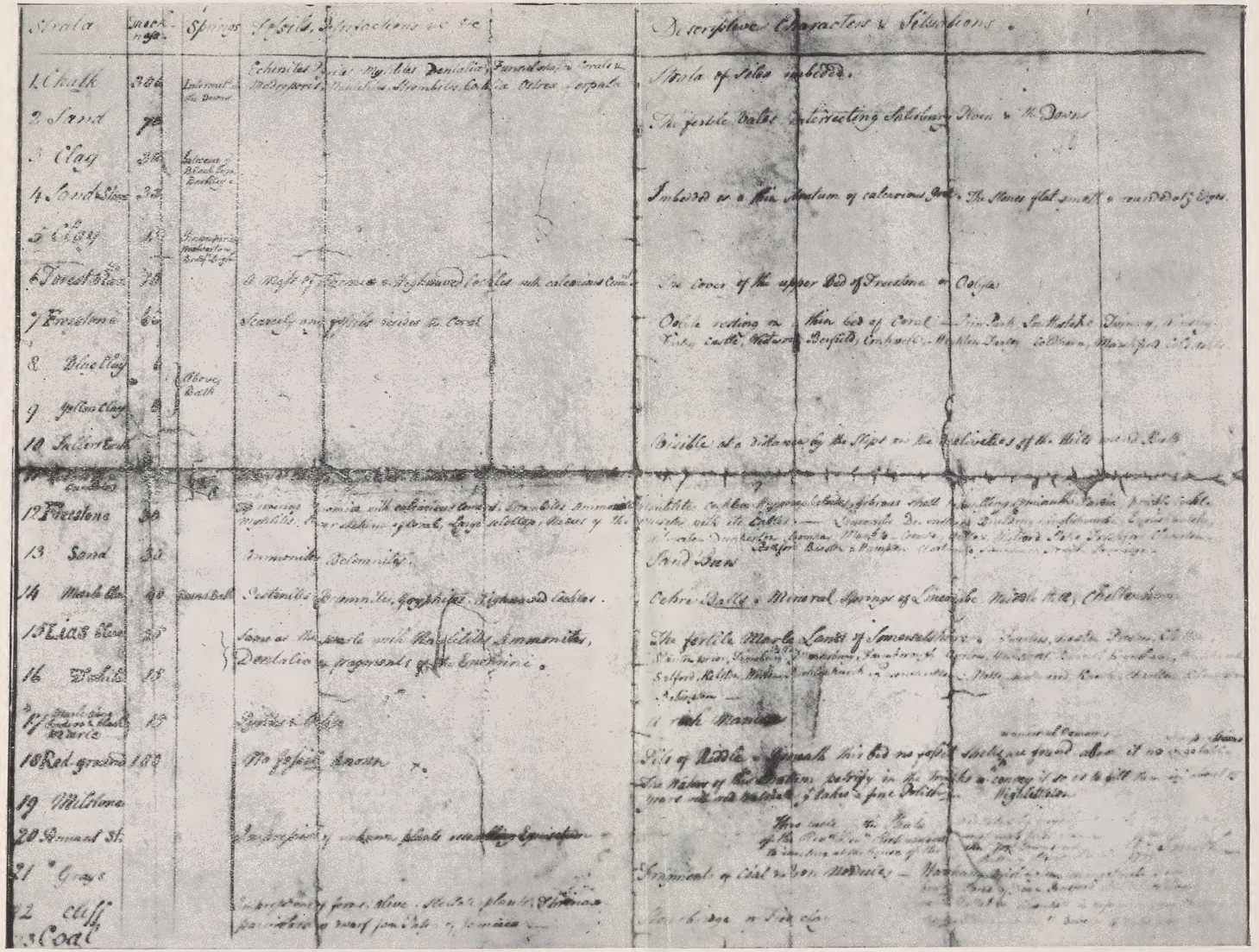


TABLE OF THE STRATA NEAR BATH.

The Foundation of the Science of English Geology.

Dictated in 1799 by WILLIAM SMITH, at No. 29 PULTENEY STREET, the house of the Rev. JOSEPH TOWNSEND, and written by the Rev. BENJAMIN RICHARDSON.

Reproduced, by Special Permission, from the Original in the possession of the Geological Society of London.

Extracts from "Memoirs of Wm Smith LLD" by John Phillips 1844

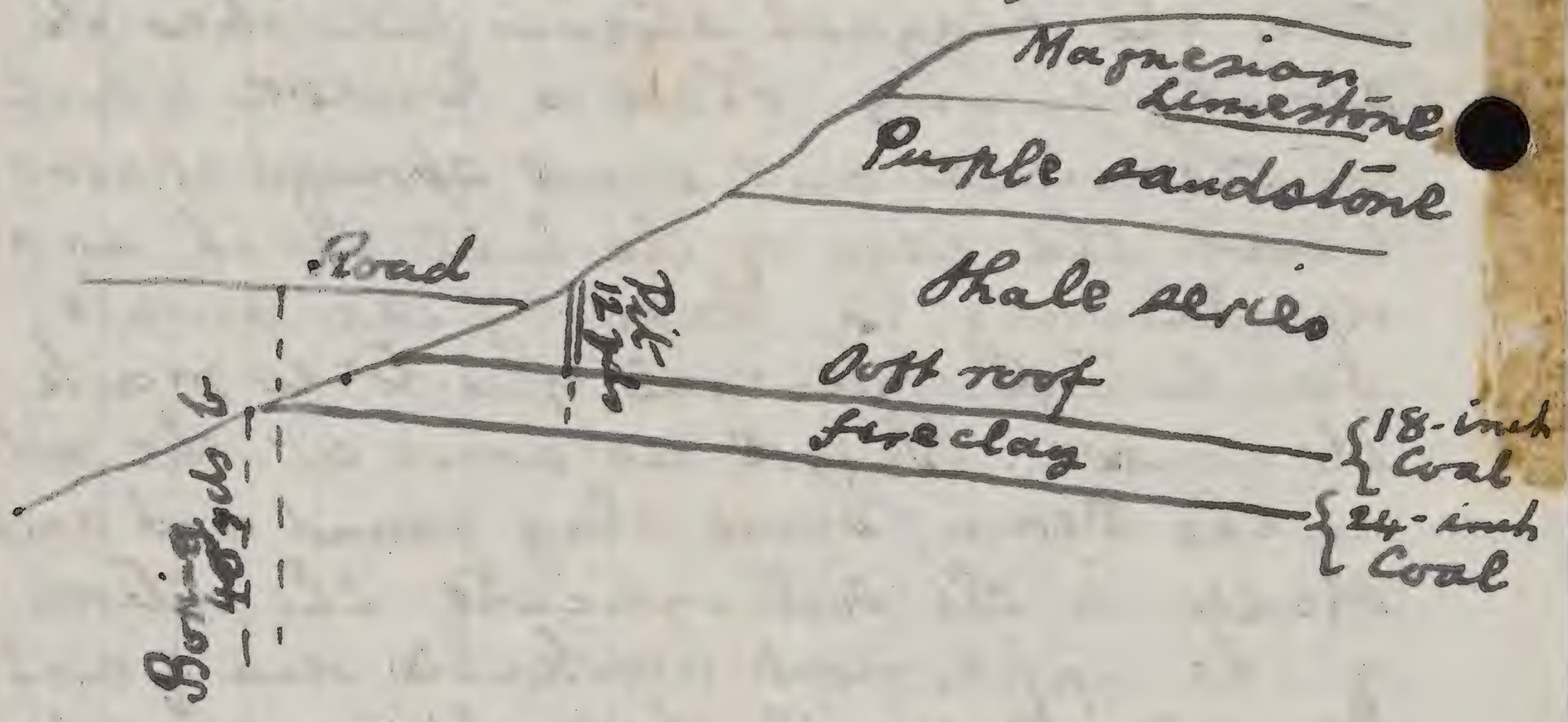
p 88. In 1817. "From the eastern coast he was called into Yorkshire to consider of a plan for a new canal between the river Aire at Knottingley and the river Dun at Doncaster, with a branch down the river Went"

p 95. "4th April 1821. Walked westward by Barlby and Warnsworth to Sprotbrough Ferry, and thence by Cadeby over the verge of the magnesian limestone there. Cadeby is so very ill supplied with water, that those who hold the pump handle must frequently wait some time till the niggard stream furnishes its scanty supply. There is, however, a pool in the place, and some springs appear above the edge of the hill which, as at Pickleberry, is kept by the purple sandstone. Several yew-trees mark its course. Before we arrive at the mill on the Dearn, some clay ground and dark shades in the soil indicate the outcrop of the uppermost workable vein of coal. Melton Hall, to the right on the edge of the limestone, is very conspicuous. We now ascend a bold bank, and at the junction of the Barnborough and Melton road, wind round a sudden swell of limestone and sandstone, whose outcropping beds form around the face a series of natural entrenchments clothed with wood. Beyond this hill the ridge recedes from our road and leaves a

broad vacancy, wherein we descry a coal-pit. To our left is Bamborough Grange, standing on detached sandstone.

'The boring marked b, now prosecuting with the hope of piercing the two coals found at Goldthorpe and Thurnscoe. The upper, at Goldthorpe, 70 yards deep, thin and not desirable; the lower 105 yards deep, 5 feet thick. Solid sinkings, soft flows, but immediately beneath hard sinkings repeated.'

To assist Mr Smith's researches the author made a variety of other journeys from Doncaster, as to Roche Abbey, Tinsley-on-the-Hill, and Gainsborough."



p 112. (1825) "on removing soon afterwards to his old quarters at Doncaster, he worked much on the large Old Survey of Yorkshire, thinking to complete the colouring of it."

p 131. "Being consulted by a landowner on the dry Mendip Hills, as to the best means of procuring supplies of water for

his farm, Smith found that he had been anticipated in delivering an opinion on this very difficult subject by a miner, who proposed to solve the problem by divination, that is to say, by the divining or powsing (chowsing?) rod. Unwilling that his worthy employer should be at the mercy of this superstition, he filled his pockets with some small stones not commonly found on the Mendips, and proceeded to witness the trial of the 'forked stick'. Accordingly the miner exercised, in presence of the owner and the geologist, the 'mystery' of the rod, and wherever the point of the twig turned downward, declared that water was to be found by digging. At these points Smith quietly dropped the stones, and when several places had been thus pitched upon, asked the miner if he could rediscover the points indicated. Unaware of the stratagem, the man readily agreed to repeat the trials on the way home. In his progress he unluckily passed the spots where the stones lay and stopped at several other localities, to which the faithless rod directed attention; on which Smith remarked, that as the water had in so short a time changed its situation at all the points, it would be imprudent to spend money in following it.

D 2 377930

Marriage Register Vol III Farmborough Church. 1754 to 1812

[Printed by authority of the Registrar-General].

CERTIFIED COPY of an ENTRY OF MARRIAGE.
Pursuant to the Marriage Acts, 1811 to 1934.

The Statutory Fee for this Certificate is 2s. 7d. If required subsequently to registration, a Search Fee is payable in addition.

M. Cert.
Church.

Registration District

1 Marriage Solemnized at Farmborough All Saints Church in the Parish of Farmborough in the County of Somerset

Columns:— 1 No.	1 When Married.	2 Name and Surname.	3 Age.	4 Condition.	5 Rank or Profession.	6 Residence at the time of Marriage.	7 Witnesses ~~Father's Name and Surname~~.	8 Rank or Profession of Father.
	27th December	William Smith	not shown		not shown	Parish of Farmborough	Isaac Smith	not shown
	1802	Betty Jones				Parish of Farmborough	Martha Trinder	

Married in the Parish Church according to the Rites and Ceremonies of the Church of England by ~~[illegible]~~ or after banns by me,

This Marriage was solemnized between us, William Smith, Betty Jones in the Presence of us, Isaac Smith, Martha Trinder

Peter Gunning, D.D. Rector

Insert in this Margin any Notes which appear in the original entry.

Not Wm. Smith the geologist.

I, G G Viner, of Farmborough in the Parish of Farmborough do hereby certify that this is a true copy of the Entry No. 164, in the Register Book of Marriages of the said Church.

WITNESS MY HAND this 5th day of October 1939

G G Viner Warden in charge of Registers

State "Rector," "Vicar," or "Curate."

Id. Stamp to be affixed and cancelled.

CAUTION.—Any person who (1) falsifies any of the particulars on this Certificate, or (2) uses it as true, knowing it to be falsified, is liable to Prosecution.

Geological Survey and Museum,
Exhibition Road,
South Kensington,
London, S.W.7.

Copy of Marriage Register Vol. III. Tamworth Church
(Old Saints Church) (1754 1812)

BANNS OF MARRIAGE BETWEEN William Smith and
Betty Jones of this Parish were published in this
Church on the 12th - 19th & 25th days of
December, 1802.

No. 164. William Smith OF this PARISH Widower
AND Betty Jones OF this PARISH Widow
WERE MARRIED IN THIS CHURCH. BY Banns this
27th DAY OF December IN THE YEAR ONE THOUSAND
~~SEVEN~~ EIGHT HUNDRED AND two by ME Peter Gunning.
Rector.

THIS MARRIAGE WAS SOLEMNISED BETWEEN US.

IN THE PRESENCE OF Isaac Smith
Martha Trinder.

(sgd.) William Smith
The mark X of Betty Jones.

NATIONAL SCHEME · FOR DISABLED MEN ·

Geological Survey and Museum,

Exhibition Road,

South Kensington,

London, S.W.7.

Copy of M.S. in handwriting of Peter Gunning Rector of Farnborough, Somerset.

" December 12th. 1802.

I Publish the Banns of Marriage between William Smith and Betty Jones both of this Parish."

(unsigned)

VELOX

VELOX

Rugborne Farm
High Littleton
(Wm. Smiths' lodging in '79)

DS

Bath.
Easter 1940.

VELOX

1 33

Wm. Smiths' house
at Midford.

DSI

Bath.
Easter 1940.

BRITISH MUSEUM (NATURAL HISTORY)

DEMONSTRATION ON "WILLIAM SMITH" GIVEN TO THE GEOLOGISTS' ASSOCIATION ON MARCH 5th 1938 BY L.R.COX, Sc.D.

LIST OF EXHIBITS

(a) Early Attempts at the construction of Geological Maps.

1. 1743.- Christopher Packe's "Philosophico-Chorographical Chart of East Kent."

2. 1751.- J.E.Guettard's "Carte minéralogique sur la nature du terrein d'une portion de l'Europe" (France and southern England).

3. 1778.- J.F.W.Charpentier's map illustrating his "Mineralogische Geographie der Chursaechsischen Lande."

4.- 1780.- Guettard and Monnet's "Atlas mineralogique de la France."

5. 1781.- Palassou's maps illustrating his "Minéralogie des Monts Pyrenées."

(b) Early Observations on the Stratal Succession in England.

6. 1719.- John Strachey's vertical section of coal mines in Somerset

7. 1778.- John Whitehurst's vertical sections of strata in Derbyshire.

8. 1788.- John Michel's (unpublished) table of English strata (area between Cambridge and Yorkshire).

(c) Works and Personal Relics of William Smith and other relevant Exhibits.

9. 1790.- Copy of Barrow's "Euclid" belonging to and autographed by Smith when a young man of 21 studying surveying.

10. Map showing the course of the Somerset Coal Canal, during the construction of which in 1794-9 Smith was employed as consultant engineer.

11. 1799.- Smith's geological map (unpublished) of "Five Miles round the City of Bath."

12. 1799.- Smith's original Table of Strata, dictated to the Rev. B.Richardson and the Rev.J.Townsend and widely circulated.

13. Photograph of the late Dr. F.A.Bather taken in 1926 at the unveiling of a commemorative tablet at Townsend's house (29 Great Pulteney Street, Bath) where Smith dictated his Table of Strata in 1799.

14. 1801.- Smith's prospectus of a proposed work "Accurate Delineations of the Natural Order of the various Strata," which remained unpublished.

15. 1801.- Smith's first geological map (unpublished) of England and Wales. G.Soc

16. 1802.- Autograph draft of a letter from Smith to the Rev. B. Richardson referring to a journey in Bedfordshire and Buckinghamshire in company with John Farey, while in the employment of the Duke of Bedford. Oxford Museum

17. 1806.- Smith's first publication, "Observations on the Utility, Form, and Management of Water Meadows." with poems by W.C.

18. 1808.- Autograph letter from Richardson to Smith referring to the King's flock of Merino sheep and to "the present fallen, lamented state of Spain." Oxford Museum

19. 1808.- John Farey's "Section of the Principal Strata of England" from Trusthorpe (Lincolnshire) to near Ashover (Derbyshire). Based largely on Smith's work. N.H. Museum

20. 1811.- Smith's report on "The State of the Collieries at and near Nailsea." do

21. 1811-3.- John Farey's "General View of the Agriculture and Minerals of Derbyshire," in which many of Smith's observations are embodied.

22. 1813.- Joseph Townsend's "Character of Moses established for Veracity as an Historian," embodying much of Smith's work on the stratal succession.

23. 1814.- Circular addressed to the Members of the Board of Agriculture inviting subscriptions to Smith's forthcoming map. Oxford Museum

24. 1815.- Smith's great map, "A Delineation of the Strata of England and Wales with part of Scotland."

25. 1815.- Smith's "Memoir to the Map and Delineation of the Strata of England and Wales."

26. 1815.- Proof-sheets, corrected in Smith's own hand, of his original Table of Strata, reproduced in his 1815 Memoir. Oxford Museum

27. 1816-9.- Smith's "Strata identified by Organized Fossils," of which only four parts out of the seven originally contemplated were published. This work includes 19 plates of characteristic fossils drawn by J.Sowerby.

28. 1816.- Preliminary sketches for two of the unpublished plates (representing Liassic fossils) of Smith's "Strata Identified." Oxford Museum

29. 1816.- Selection of fossils belonging to Smith's main collection purchased by the Trustees of the British Museum in 1816.

30. 1817.- Smith's "Stratigraphical System of Organized Fossils."

31. 1817.- Original MS. of the Introduction to Smith's "Stratigraphical System of Organized Fossils." Oxford Museum

32. 1818.- Smith's MS. catalogue of a supplementary collection of fossils purchased from him by the Trustees of the British Museum in 1818. N.H. Museum

33. 1817.- Smith's "Geological Section from London to Snowdon."

34. 1819.- Smith's Geological Sections of various counties.

35. 1818.- Pamphlet entitled "Geology of England. Mr. Wm. Smith's Claims." Sedgwick Oxford Museum

36. 1819-24.- Smith's Geological Atlas of county maps.

37. 1820.- Smith's "New Geological Map of England and Wales."

38. 1824.- Further edition of Smith's "New Geological Map."

39. 1824.- Cuttings from a York newspaper referring to a series of geological lectures delivered by Smith. Oxford Museum

40. 1831.- Newspaper cutting referring to the meeting of the Geological Society at which the first Wollaston Medal was awarded to Smith by Professor A. Sedgwick, who greeted him as "Father of English Geology." Oxford Museum

41. 1832.- Smith's Geological Map of Hackness (Yorks.).

42. 1832.- Folio sheet entitled "Synopsis of Geological Phenomena" exhibited by Smith at the Oxford meeting of the British Association. Geol. Soc.

43. 1836.- Copy of a paper by W.P.Hunter on the "Bursting of a Bog in the County of Antrim, Ireland" (1836) with copious annotations in Smith's hand. Wright

44. 1837.- Two short papers by Smith entitled "Practical Distinctions in Minerals" and "Coal Finding" published in the Magazine of Natural History for 1837. W.

45. 1838.- Portrait of William Smith at the age of 69, by Fourau. This was painted about a year before Smith's death.

46. 1839.- Books referring to the accounts of Mr. and Mrs. Wm. Smith at the shop of Wm.T.Hart (draper). The last entry in Wm. Smith's book is dated April 3rd 1839 and that in Mrs Smith's book Aug. 28th 1839. Oxford Museum

47. 1839.- Report of a commission, consisting of Charles Barry, H.T De la Beche, William Smith, and C.H.Smith, with reference to the selection of a stone for building the new Houses of Parliament. Published shortly after Smith's death.

48.-1844.- The "Memoirs of William Smith," written by John Phillips, his nephew

49. 1872.- Title page and illustrations intended for a work by W.S.Mitchell entitled "William Smith, LL.D., and the Somersetshire Coal Canal." This work was not published. N.H. Museum

50. 1917.- Mr. T. Sheppard's monograph entitled "William Smith, his Maps and Memoirs,"(Proc. Yorkshire Geol. Soc., vol.xix).

CENTENARY OF WILLIAM SMITH

"THE FATHER OF ENGLISH GEOLOGY"

1839

1939

HIS CONNECTION WITH BATH

By T. SHEPPARD, M.Sc., F.G.S.

THERE are many memoirs dealing with William Smith; the earliest by his nephew, John Phillips, being published in 1844. More recently Dr. Henry Woodward, the late Professor J. W. Judd, and others have referred to his life and his maps. Smith's work has, naturally, had a considerable effect on the progress of Yorkshire geology, especially as his nephew and pupil, Phillips, received from him his early inspiration and training.

William Smith was born at Churchill in Oxfordshire in 1769, and died at Northampton while on his way to the British Association meeting at Birmingham in 1839, when he had reached his three-score years and ten.

In 1815 Smith purchased a property near Bath for the working of freestone, but it so happened that he, the one person then able to judge of the quantity and quality of stone, was deceived, and he lost heavily. His geological collection was sold to the British Museum in 1816, and two years later they acquired a further collection from him. He received £700 in all from the Museum authorities.

In 1794, while engaged in the construction of a canal in the South of England, William Smith, "their engineer," was sent with two other members of the Canal Company on a 900 miles tour, in order to examine other navigations. During this trip he took notes

of the country he passed through, and the following was written with regard to Somerset and Yorkshire :

" We found the small steam-engines much better applied to raising coal in Yorkshire than in Somersetshire, where not more than one (I believe), badly constructed, was then in use."

So long ago as 1799, Smith published " A Map of Five Miles round the City of Bath, on handwriting :—" Presented to the Geological Society, February 18th, 1831. Wm. Smith, Coloured Geologically in 1799."

Though no lines are drawn, Smith's well-known method of colouring the base of a formation with a deep tint and shading this upwards towards the outcrop of the next overlying stratum enables us to see how carefully he had mapped all the geological lines around Bath. There are only three colours employed

SMITH'S "GEOLOGICAL MAP OF BATH"

a scale of one inch and a half to a mile, from an Actual Survey, including all the new roads, with Alterations and Improvements to the present time, 1799. Printed for and sold by A. Taylor and W. Nayler, Booksellers, Bath." The map is circular, and fifteen inches in diameter. A copy is hung in the library at the Geological Society, Burlington House, and it bears the following inscription in Smith's on the map and no index ; but it is evident that the yellow tint represents the Bath Oolite, the base of the freestones being very accurately mapped so that even the smallest outlines can be made out, agreeing most closely with the recent map of the Geological Survey ; a blue tint is drawn at the base of the Lias and a red one at the base of the Trias, the inliers of Carboniferous being left blank.

This excellent map, though with the date in one place altered to 1800, but with 1799 in another, appears in a fine work, " The Historic and Local New Bath Guide," 12mo, 160 pp., and there can be no doubt Smith obtained it from this source and added the colours.

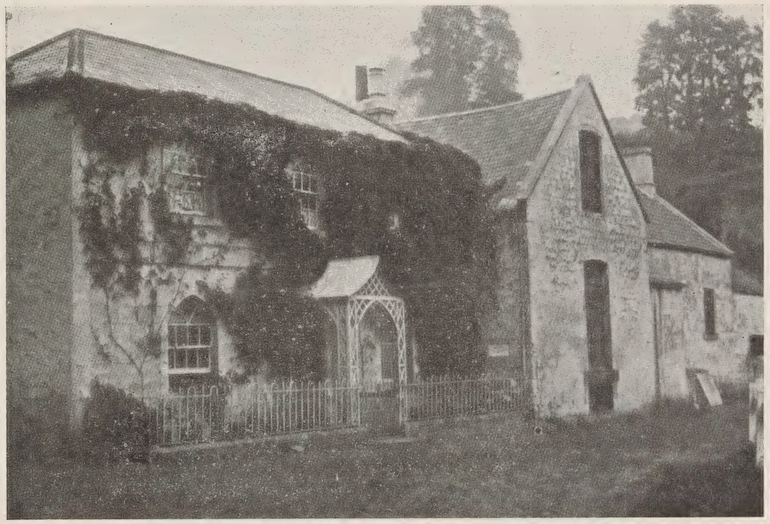
Fortunately we are able to show precisely what claims Smith had to priority in the way of geological mapping. When the first Wollaston Medal was awarded to him in 1831 he presented to the Geological Society " some documents referred to in the President's address." These were :

(1) A Table of the Order of Strata and their imbedded Organic Remains in the vicinity of Bath ; examined and proved prior to 1799.
(2) A map of the country five miles round Bath, on the scale of one and a half inches to the mile. Coloured geologically in 1799 by William Smith.
(3) The first draft of a geological map of England and Wales, entitled General Map of Strata found in England and Wales, by William Smith, surveyor, 1801.

These documents, already referred to, were carefully preserved by the Society, though they are now considerably faded, and the old varnish on them does not add lustre ! A few years ago they were carefully copied and critically examined by Professor J. W. Judd, copies being placed in the Science Museum at South Kensington ; the library of the Geological Society ; the Natural History Museum, South Kensington ; and the British Museum Library at Bloomsbury.

The first in the list is described by Phillips as follows :

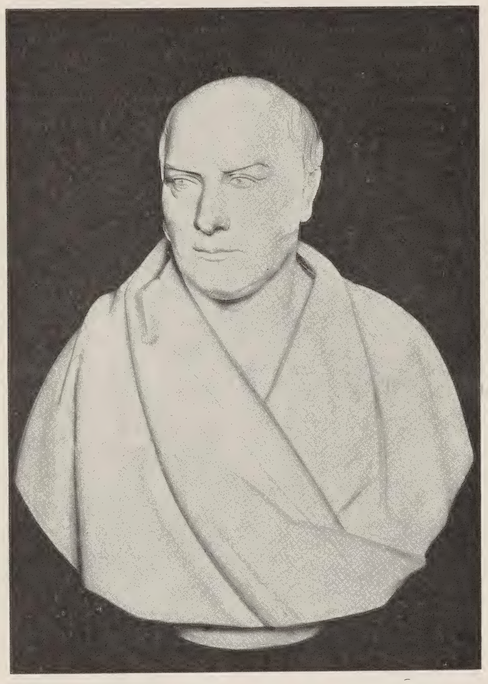
" One day, after dining together in the house of the Rev. Joseph Townsend [29, Pulteney Street, Bath], it was proposed by one of this triumvirate [Smith, Richardson and Townsend] that a tabular view of the main features of the subject, as it had been expounded by Mr. Smith and verified and enriched by their joint labours, should be drawn up in writing. Richardson held the pen and wrote down from Smith's dictation the different strata, according to their order of succession in descending order, commencing with the Chalk and numbered in continuous series down to the Coal, below which the strata were not sufficiently determined. To this description of the strata was added, in the proper places, a list of the most remarkable fossils which had been gathered in the several layers of rock. The names of these fossils were principally supplied by Mr. Richardson, and are such as were then, and for a long time afterwards, familiarly employed in many



MIDFORD MILL

collections near Bath. Of the document thus jointly arranged each person present took a copy, under no stipulation as to the use which should be made of it, and accordingly it was extensively distributed and remained for a long period the type and authority for the descriptions and order of superposition of the strata near Bath."

The table referred to bears the following inscription in the handwriting of Smith: "This Table of Strata, dictated by myself, agricultural or soil maps. . . . How far William Smith was in advance of his contemporaries is shown by a comparison of this map of William Smith, showing carefully indicated lines of outcrop, with the excellent map of the Environs of Paris by Cuvier and Brongniart (1809), in which colour is spread over the areas occupied by the several formations, without any clear and definite indications of the actual limits of the outcrops. The colours used by Smith in this map were the



BUST OF WILLIAM SMITH

is in the handwriting of the Rev. Benn. Richardson, and was first reduced to writing, at the house of the Rev. Joseph Townsend Pulteney St., Bath, 1799. William Smith." This important table of strata is reproduced in Phillips's "Memoirs" (p. 30), and many of the names there given are still in general use.

With regard to the second document in the series, as Professor Judd points out, it is "even more interesting, as it may justly be regarded as the oldest geological map in existence, if we distinguish geological from same as those employed by him in the later maps of 1801 and 1815, and thus we have in it the first indication of a scheme of colour now very generally adopted by geologists."

The third document is a copy of Cary's Index to the Map of England, coloured geologically. It has the manuscript title, "General Map of Strata found in England and Wales by William Smith, Surveyor, 1801." This map was the basis of his later map of 1815. Certain omissions and errors are noteworthy as affording the clearest evidence that the map was actually

constructed at the date written upon it (1801) and that it had no additions made to it at a later date. The absence of any colouring for the Tertiary Strata of East Anglia and the London and Hampshire Basins, for the Wealdon area, and for the Jurassic district of the Eastern Moorlands of Yorkshire is especially striking in this connection.

Smith's great work, of course, was his wonderful large map of England and Wales, projected in 1801, but not finally published until fourteen years later. This delay certainly resulted in there being much more detail upon it. No fewer than 20 different colours are used in the map, in addition to which three uncoloured spaces occur in the legend. The map measures 6 feet by 8½ feet and the scale is five statute miles to an inch. It includes England, Wales and that part of Scotland occurring below a line drawn from the Forth of Tay westward.

There are three oil-paintings of William Smith in existence, but the favourite one is that in the Geological Society's Rooms, Burlington House, London, which is reproduced herewith. There is a monument to him in St. Peter's Church, Northampton, underneath which appears:

"To honour the name of William Smith, LL.D. This monument is erected by Friends and Fellow-Labourers in the same field of British Geology. Born 23rd March, 1769, at Churchill in Oxfordshire and trained to the Profession of a Civil Engineer and Mineral Surveyor. He began, in 1791, to survey collieries and plan canals in the vicinity of Bath, and having observed that several strata of that district were characterised by peculiar groups of organic remains he adopted this fact as a principle of comparison, and was by it enabled to identify the strata in distant parts of this island, to construct sections, and to complete and publish in 1815 a Geological Map of England and Wales. By thus devoting during his whole life all the power of an observing mind to the advancement of one branch of Science, he gained the title of the 'Father of English Geology.' While on his way to a meeting of the British Association for the Advancement of Science at Birmingham, he died in this town, at the house of his friend, George Baker, the historian of Northamptonshire, 28th of August, 1839."

This marble bust, however, is rather conventional and very different indeed from a bust in the Hull Museum, which was made from a plaster cast of his features taken during life.

The Earl of Ducie erected a monument to Smith's memory at Churchill, Oxfordshire, which is in the form of a monolith on two massive steps, and bears the inscription: "In Memory of William Smith, 'The Father of British Geology'; Born at Churchill, March 23rd, 1769; Died at Northampton, August 28th, 1839. Erected by the Earl of Ducie, 1891."

Of more interest to Bath, however, is the stone inserted to his memory at Midford, near Bath. It seems that during the meeting of the British Association at Bath in 1888, a committee of the Bath Natural History and Antiquarian Field Club was appointed, with the Rev. H. H. Winwood as Secretary, for the purpose of tableting the house where William Smith resided longest. "After every possible enquiry was made, the uncertainty as regards any house in Bath was so great that the Committee decided to recommend that the memorial should be placed on the house adjoining the Tucking Mill at Midford, where there was no doubt he had lived for several years. Accordingly in the following year, 1889, the Committee, having obtained the sanction of the proprietor, had the memorial of this distinguished geologist inserted in the wall, where it may be seen on the bank of a portion of his own canal." The tablet reads:

"Here lived
William Smith
'Father of English Geology,'
Born 23rd March 1769.
Died 28th August 1839."

The photograph of the Mill at Midford, showing the position of the memorial stone in the wall to the right of the porch, is reproduced from Plate XXV. in my Memoir.

[The author is the leading authority on the life and work of William Smith. His monograph on William Smith: His Maps and Memoirs, which consisted of nearly 200 pages, and was published by the Yorkshire Geological Society in 1920.—Ed.]

A Memorial Tablet on the wall of the house in which Wm. Smith dictated "The Order of the Strata" was unveiled on July 10th 1926, by Dr. F. A. Bather, President of the Geological Society of London. In an address on that occasion he said:—"Possibly we owe to Smith the fact that Bath still persists. In 1810 the city was threatened with ruin by the loss of its very life blood. The hot springs had failed. Smith was called in and after much argument obtained permission to open up the hot-baths spring to the bottom. Thus he found as he anticipated, that the water had flowed away into new channels. By stopping these, the water was restored, and the baths filled in less time than formerly."

The Village Whist-Drive

By TOUCHWOOD

MY occupation or "profession" as a "commercial traveller" takes me to some strange places, and among them is a village tucked away in a fold of the hills in the wild-west-country, which I will call Rexford. Occasionally I have to stay the night, and find excellent quarters at the local inn, which bears the unique name of the "Sow and Rooster." The "landlord," whose name is Uriah Peabody, is round of body and short of leg, and has a full florid face which beams a welcome to his customers. He speaks a broad dialect, and I have listened to several funny yarns he has told me concerning the doings and sayings of the villagers.

Porlock Weir Village, Somerset

Chief among them are the blacksmith, shoemaker and roadman, and this is how Uriah (which he insists on being called) introduced them to me :

"You must know, zur, that Jacob Short is the blacksmith's name, an' the cobbler is called Izaac Long, but they ought to change names, vor the blacksmith is zix voot 'igh, an' the cobbler idden more than vive voot een 'is boots. They be good vriends, but always taizin wan t'other about zomethin' or other. They both keeps vowls an' be vor ivver arguin' about which cross-breed is the best vor layin' an' which is best vor the table.

"An' then they'll start on their 'trade,' an' the cobbler zays the blacksmith's is inferior to 'is, becuz 'ee zhoes 'osses, an' mules, an' dunkeys ; while 'ee only zhoes youman beins. But the blacksmith 'ats back at en, an' zays the mules an' the dunkeys 'ee zhoes got more zainse than zome ov' is youman beins.

"Tiz vunny, but they two was born the zame day, an' people zays the Passon made a mistake whain 'ee crissened 'em both to once, an' that the vive voot cobbler should 'ave bin called 'Ikey Short,' an' the zix voot blacksmith, 'Jakey Long' ; but ov course, zur, that's only a joke.

"The roadman I mentioned is called Zebedee Trimlett, an' 'ee an' the cobbler be thick as thieves, vor they be the only two 'radikles' een the parish, zo var as anybody knows. Ivverybody knows that Zebedee is a poacher, but 'ee nivver bin catched, vor 'ee used to be a gamekeeper, an' 'ee knows all the tricks ov the trade.

"There's gwain to be a 'wiss-draive' down to the School-room to-night, an' they'll zure to be there, an' p'raps their wives will be long wi' 'em. There's gwain to be twenty tables, an' the Vicar is to be 'boss.' M.C., the cobbler calls en, whativver that mains. The tables be numbered, an' ivvery one got a card on en showin' what's 'trumps,' xcept number vive, tain, vifteen an' twainty, which be 'no trumps.' The Passon makes a spaich bevore we takes our places, an' zays no gennelman is to zit at the zame table as 'is wive to commence wi', but eef they 'appens to get drowed together later on nobody can't 'elp it, but 'ee 'opes vor the best. Ov course this makes ivverybody laugh, becuz we all knows what 'ee mains. Then 'ee zays that atter ivvery ''and' the winning lady must go vore an' the winning gennelman back ; an' zome o'm doant zeem to know which is vore an' which is back, an' there's a purty ole scummer till they be zorted out. We 'aves two 'wiss-draives' a year, an' this is the second, an' I mind what the last one was like."

"Are visitors allowed to be present as players ?" I asked the landlord. "Yes, zur," he said, "you'll be very welcome eef you like to come along wi' me, an' I'll interduce 'ee to the Vicar. My wive zays 'er'd rather stop 'ome an' tend to the business, an' I can get along ; but 'er knows there'll be noart 'ardly doin', vor moast ov our customers will be to the 'wiss-draive.'"

Village of Holford, Somerset

"What time does it commence ?" I asked, and Uriah said "Zebem o'clock, an' tiz nearly aff-past zix now, zo we'd better zee about 'straikin'' down long."

So we went, and found a motley company already assembled, and a number had already seated themselves at the tables. The landlord introduced me to the Vicar, who gave me a hearty welcome ; and then I recognised Isaac Long, the shoemaker ; Jacob Short, the blacksmith ; Elias Grant, the pig-breeder ; Abel Tout, the mason ; and Noah Green, the gardener.

"Yer comes Varmer Giles an' 'is wive," said Uriah, "an' yer's Zebedee Trimlett an' 'is wive, an' Mark Parker, down the general shop, a'n 'is wive. An' yer's Mrs. Andycop an' Mrs. Ammett, an' yer's the Bobby's wive, zo I expec' Zolomon is on duty ; but I reckon 'ow 'ee'l look een vore long to zee tiz all right."

The Vicar now rang a bell and asked everybody to take a seat, and, as it fortunately turned out, the number of ladies and gentlemen was equal.

"We will zit yer, zur," said the landlord, "vor this is No. 12, and yer's the cobbler zot to the next table, which he always zays is 'is lucky number, No. 13. We shall yer a bit ov vun, vor Ikey's tong will be gwain all the time."

Mrs. Hammett became the landlord's partner, and Mrs. Bennet, the policeman's wife, was mine. We were issued the usual scoring cards and pencils, an' Mrs. Hammett remarked "Yer's purty tiddley pencils to be zure," and Mrs. Bennet said "Yes, dainty, aren't they."

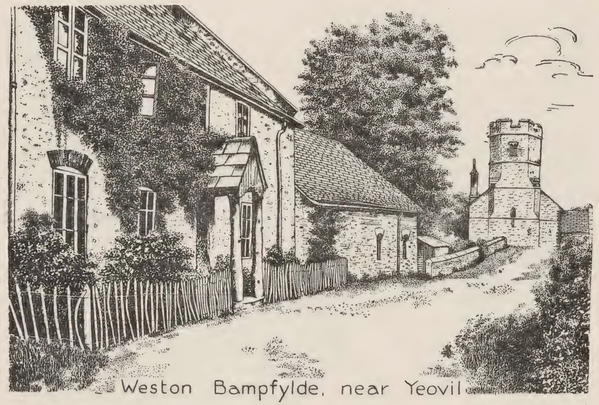
All seats were now taken, so the Vicar again rang the bell and announced the rules and procedure, after which he declared the "drive" begun.

Mrs. Bennet was quite a good intelligent player, but Mrs. Hammett (to use Uriah's words) was a "proper noodle." She sorted her cards into suits and laid them face down on the table, and said "Let me zee, what be trumps? 'Oaks,' idden 'em ? An' I only got wan ov the toads."

Of course, we could see she had one suit of three, one four, one five, and the odd trump, which she straightway led. Uriah looked daggers at her, but only said "What made 'ee laid thic, Missus ?" and she said "To be zhortzuited ov course."

We played out the "hand," and on account of the landlord having an extraordinary good lot of trumps and other cards, they made seven tricks, and Mrs. Hammett exclaimed "There, we've licked 'em, Mr. Peabody, an 'Oaks' was trumps, wadden 'em, ?" I found some of the older villagers called "Clubs" Oaks.

At No. 13 table sat the cobbler with Mrs. Grant for partner, and Abel Tout with Mrs. Andycop. We could hear the "cobbler's tong," as Uriah had predicted, and he was apparently in high glee, for he would play a card and say, "Now Abel, you ba'nt 'able' to cap thic, an' 'yer partner idden 'able' to nether. Come on, Mrs. Andycop, an' 'urry up, or all our veet will get cold. That's right, Missus, but yer's 'is maister, an' Abel idden 'able' to do noart wi' en, be 'ee Abel ?"



Weston Bampfylde, near Yeovil

The cobbler held 12 tricks, and when Mrs. Grant played the next best card the cobbler fairly danced with delight, and shouted "Yer, yer, Mrs. Grant, we got all thurteen tricks, an 'ave made the "gran' slam,' an' tiz a pity we got to laive No. 13 table, vor tiz always my lucky number."

Being the losers, Mrs. Bennet and I had to remain at No. 12, but with fresh partners. Farmer Giles was Mrs. Bennet's new partner, and I was favoured with Mrs. Parker. Both ladies were good players, but Farmer Giles knew more about turnips than cards, and the policeman's wife tried to be patient, but 'twas difficult. "I know I be a gurt 'mum-'aid,'" he said, after having trumped his partner's trick, and Mrs. Bennet agreed. We made seven tricks, so had to pass on and leave Farmer Giles and Mrs. Bennet at No. 12, and I believe Farmer remained there most of the evening. There was an interval at half-time for light refreshments, and it was most amusing to hear the remarks and criticisms of the players about each other. The policeman arrived during the refreshment interval, and Mrs. Trimlett, the roadman's wife, said "No doubt he smelled the coffee, and was come to arrest a cup or two." And the "Bobby" told her he would prefer to arrest the poacher who had the Squire's pheasants last night, if he could catch 'en. "An ivverybody knows who 'ee mains," I heard one lady whisper to another.

Here are a few samples of the criticisms and witticisms of the players, mostly taken good naturedly :

"Ole Dan'l Day's wive revoked twice, an' when she was told about it, said 'I've bin provoked dree or vower times, zo what odds ?'"

"Tim Andycop was zot to a 'no trump' table an' a'ad Mrs. Stokes vor a partner. Th' old dumman 'ad to lead an' 'er'd got a vistvull ov 'spades,' and put down a 'diamond.' T'other two 'ad nearly all the 'diamonds,' an' they made tain tricks, an' they only made dree, when zhould 'ave bin t'other way about."

"Young Malachi Copp and Abigail Pumfrey zot to a table where ''earts' was trumps, an' Zebedee Trimlett zaid they was 'oldin' 'ands under the table moast ov the time, an' didden like it when they 'ad to go to different tables, although they zot to the vust table vor dree or vower games."

"The cobbler zaid 'ee a'd zixty-vive tricks on 'is card, an' as eight games 'ad bin played, that was an average ov jist over eight, an' 'ee expected 'ee was top scorer ; but Mrs. Grant zaid 'ow 'er 'ad zixty-zix, so that licked ole Ikey."

The second half of the drive was just "at par" with the first, and then came the checking of cards. Mrs. Grant, Mrs. Bennet and Mrs. Giles were the first, second and third "ladies'-prize" winners ; and Mrs. Andycop won the "booby prize," which was a "baby's dummy," and which she "dreatened to drow to the Vicar's aid."

For men's prizes, the cobbler was first with 130, an' 'ee zaid that was all right because 13 was 'is lucky number, an' 'ee'd got tain o'm.

The blacksmith was second, the landlord third, an' Varmer Giles 'ad the "booby prize." which was a penny tin whistle, an' the cobbler told 'en 'ow 'ee'd be able to play "The Ducks ait all the Barley."

So ended the "village whist drive," and in spite of a few disappointments and grumbles, I think nearly all spent an enjoyable evening, and I am sure I did.

WHERE THE AVILLE MEETS THE SEA

By Margaret and Arthur Cornish

A winding course the Aville takes,
Through wooded vale and ancient town ;
By packhorse bridge and rustic mill,
'Neath castle old of great renown.

Past mead and mere where willowherb
Grows thick around a stony reach,
It wanders through rich pasture land
Until it finds the Dunster beach.

A lark ascends from meadows green,
There well-fed cattle graze and rest ;
The plaintive lapwing circling near
Is fearful for its secret nest.

A "wisp" of snipe shape zigzag course,
The kestrel hangs in limpid sky,
A "spring" of teal take hurried wing,
The noisy redshank dashes by.

In nearby wood the nightingale
Pours forth his wondrous flow of song ;
While overhead to moorland home
A curlew wings his way along.

The sun glints through a leafy bower,
The rapid stream flows crystal clear,
A speckled trout lurks 'neath the bank,
Blackbird and thrush delight the ear.

Beneath the overhanging boughs,
A streak of sapphire cleaves the air,
The gorgeous halcyon skims the weir,
Oh ! little speckled trout, beware !

A dive so swift that human eye
Its fleeting course can scarcely follow,
That troutlet swimming near the bank
No more will seek its shady hollow.

A fleck of foam upon the sand ?
No ! 'tis the dainty sanderling ;
A flash of white across the waves,
Where dunlins swerve upon the wing.

The gaudy sheldrake stops to preen
His downy feathers bright and gay ;
A wagtail flits from stone to stone,
Whimbrels pass by in early May.

The white-winged gulls fly slowly by,
Where silver Severn laps the verge,
The "sea-pies" whistle 'cross the bay,
The turnstones foray in the surge.

Upon the shore a heron stands,
A lordly swan swims bold and free,
Where golden plover haunt the strand,
'Tis there the Aville meets the sea.

BIRD-WATCHING BY A SOMERSET POND

By A. V. CORNISH

TO the inland bird-watcher the vicinity of water, in the form of lakes, reservoirs, or ponds, is a great asset, especially if there are a fair number of trees and bushes in the neighbourhood.

Last winter during a morning's walk across the hills we only saw a missel-thrush and a small "charm" of goldfinches, but returning by a different route we had to pass a tiny pond fed by an even smaller stream. This pond, situated at a point where two woods meet, is surrounded by willows and sallows which encroach upon the small amount of water available. But even at a distance we began to notice a change, our approach being heralded by the hoarse "caar, caar" of a carrion-crow perched on the top of a tall fir-tree near the pool.

Many people have difficulty in distinguishing between the carrion-crow and the rook, but the crow, like his character, is entirely black all over, whereas the rook has the base of the bill and face greyish white. It is also a more solitary bird, and an old Irishism which says, "If you see a rook alone it is a crow. If you see many crows together they are rooks," is a helpful phrase to remember.

When within a few yards of the pond a dainty little bird with a jet-black head and throat, white cheeks, an olive-brown back, and dove-coloured under-parts, flew out of a bush, alighting in the grass a short distance away. It was a marsh-tit—one of the rarest of our local tits—a small but delightful bird to watch. In a moment it was joined by a second, both birds picking up tiny insects or seeds, which they carried back to the bush to eat, and then returned for more.

Next a flock of fieldfares flew over from one wood to the other, chattering and wheeling as they alighted in search of a fresh supply of berries. The fieldfare—a winter migrant slightly larger than our resident thrush, which it somewhat resembles—can generally be distinguished by its ash-grey head, nape, and lower back; while the white underwings, frequently displayed during its swerving flight, give another clue to its identity.

Hardly had this flock settled down when we caught a glimpse of the black-and-white plumage of a magpie disappearing through the wood.

Arriving at the pond our next discovery was a hen bullfinch feeding among the willows on

the opposite bank. Although lacking the beautiful red breast and smoky-grey upper-parts of the male bird, her black cap, wings, and tail, soft brown back and breast, and white rump are very attractive in a more sober way. Alas! she did not trust us and soon disappeared amongst the trees.

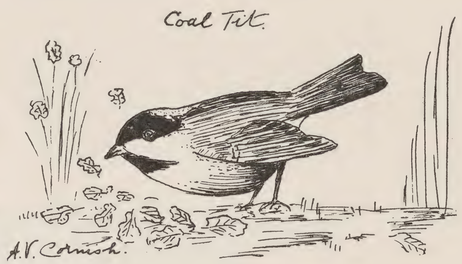
But "bully" was not the only bird in the willows. A slight movement in the lower branches drew our attention. At first we thought it was a wren; then suddenly it flew to an exposed bough, and there, in perfect view, was a lovely goldcrest, or golden-crested wren. Actually the same size as the common wren, it frequently looks even smaller, and is far more colourful. One's first impression is of an olive-green back tinged with yellow, wings slightly darker with white cross-bars and patches of black, and a brilliant orange crest along the crown of the head, from which it takes its name. Altogether a charming little bird, and easy to study because it is so tame.

Shortly afterwards we heard the shrill piping notes of a "school" of long-tailed tits,

and were able to count eight of them flying across the valley to an oak-tree in the adjoining lane. We left the pond to study these tiny new-comers. Never still, the whole tree seemed to literally swarm with them, but, thanks to the bareness of the winter boughs, it was easy to see their black, white and pink colouring. Apart from their ridiculously long tails—more than three inches in length—they were no larger than the goldcrest we had just seen.

Soon they drifted on, and we had time to notice a solitary blue-tit busily engaged in clearing up whatever insects they had left. No need to describe its blue and yellow body, or its gymnastic displays—familiar sights on every bird-table.

In a moment or two it was joined by one of its big cousins, a great-tit—the largest member of the tit tribe. A fine, handsome fellow, with



a blue-black head and throat, white cheeks, and a white patch on the nape of the beak above his olive-green back; wings and tail dusky blue, and lovely yellow under-parts divided by a black band.

But there was little time to watch him displaying his colours, for down from a neighbouring tree descended another far more interesting bird—a tree-creeper—which alighted

on the foot of a massive pine a little farther down the lane. Instantly it started to ascend the trunk in a series of jerky movements, its brown back, slightly variegated with black, white, and buff, and spasmodic running gait, reminding one of a mouse. As it circled the tree-trunk the silky white breast and under-parts came into view, also its slender curved bill probing into every crack and cranny of the rough bark in search of grubs. The tree-creeper might well be called the Duke of York of the bird world, for it seems to spend the whole of its life climbing up one tree, then flying down to the base of the next, and starting all over again.

Finally it disappeared among the higher branches, and our attention was drawn to a continuous drumming sound behind us, which at times developed into a regular tattoo.

Realising that this must be made by one of the woodpecker tribe, we retraced our steps towards the pond, scanning the trees on the way. Before long we also heard a loud tapping sound close at hand, and there, almost above us, clinging to the side of a large bough, and hammering off pieces of dead bark with its strong bill, was a nuthatch.

The nuthatch is a lovely bird with a blue-grey head and back, white cheeks and throat, a thick black line running through the eye, and buff under-parts deepening to chestnut along the flanks. Although only the size of a robin, one gets the impression of a much larger bird. Building its nest in holes in trees it has the distinction of being a bird mason, for if the hole is too large it plasters it up with clay to the required size.

But still the ceaseless tattoo continued on our left, so, leaving the lane, we climbed the steep wooded bank, and soon located a barred woodpecker creeping along the underside of an oak branch, which it hammered incessantly in its search for hidden insect life. The smallest and rarest of its race, the barred, or lesser spotted woodpecker, as it is frequently called, has a black back heavily barred and spotted with white, white under-parts, and a crimson crown. It is found chiefly in southern England, being scarce elsewhere.

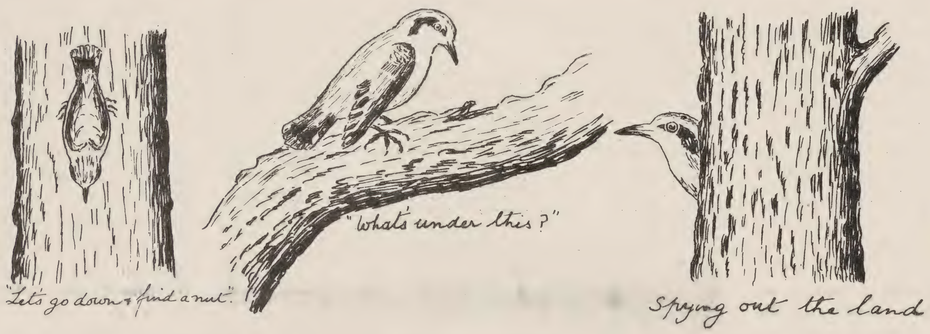
Before long it flew on to another tree, and, in our endeavours to obtain a closer view, we came upon the only member of the titmouse tribe we had not previously seen—a delightfully tame coal-tit pecking about on a mossy knoll. Apart from a white patch on the nape of the neck, its general colouring was very similar to that of the marsh-tits.

Suddenly pandemonium broke loose. All the fieldfares in the surrounding woods began to utter their chattering calls. We caught a glimpse of a screeching jay as it dashed off through the trees; then above the hubbub there came the shrill cry of a buzzard on the wing.

As we watched through the trees a pair of these splendid hawks came circling low down over the wood, their huge up-tipped wings and broad tails revealing a barred and speckled mixture of brown and white. In a few seconds nothing was to be heard but their mewing cries.

All other birds vanished as if by magic. Their calls and hammerings ceased. The wood appeared to be absolutely devoid of bird life.

Returning to the lane, it seemed almost impossible to believe that during the past half-hour we had seen no less than fifteen different species of birds—several of them far from common—and now nothing remained in sight but a pair of our famous Exmoor hawks.



(Sketches by Margaret Cornish).

The auction of the tolls of Somerset's last toll bridge took place at Burrowbridge in accordance with an old-established law. The biddings have to be made while the sand runs through an old wooden-framed sand-glass, and a special condition is that after the last bid the sand has to run through the glass three times. The sale was probably the last which will be held, for the Chairman of the Bridge Commissioners stated that the £1,725 paid for the right to collect tolls for 12 months from all traffic using the bridge would probably be sufficient to redeem the bridge entirely.

THE ANCIENT ORGAN AT MUCHELNEY

AWAY down in the South of Somerset, and two miles from Langport, is the quaint old village of Muchelney.

In mediæval times it was known as Muckleeye, deriving its name from the fact that it was originally built on an island, standing dry amid the surrounding marshes.

The village is rich in antiquities, for there is a fine old cross, reverently restored, also a priest's house with thatched roof and quaint old windows dating from the fourteenth century. But most notable of all is the old building known as the Abbot's House, which is nearly all that remains of the tenth-century Abbey.

Amid such wonders as these the village church might well be overlooked, and yet it contains a barrel-organ of dignified appearance and great interest.

Photo] [W. Rouse

The organ possesses three barrels, one at the top and two underneath, and is in very good condition. It was in regular use up to the eighties of last century, when it was supplanted by a modern instrument. It was originally installed about 1807, by Messrs. Gray & Davidson, whose name it still bears, with their address, 9, New Road, Fitzroy Avenue, London. Here are the thirty tunes, ten on each barrel:

Angels' hymn, Acton, Bedford, Cambridge, Carlisle, Chant double (Battishill), Chant double (O. Gibbons), Chant double (Lord Mornington), Devonshire, Easter hymn, Evening hymn, Hanover, Helmsley, London New, Morning hymn, Manchester, Mount Ephraim, New York or Sheldon, Old Hundredth, Petersborough, Responses to nine Commandments, Response 10th Commandment, Rockingham, Saint Anne's, Saint Stephen's, Sicilian, Surrey, Vienna, Warwick and Wells.

The tunes in the Muchelney organ all date from the eighteenth century and afford a useful clue as to the most popular hymn-tunes of the period.

The organ was presented to the church by the writer's great-grandfather (William Stuckey), born at Muchelney Abbey in 1773, died 1842.

MARY STUCKEY CLARK.

'Ding Darling," the ancient curfew bell of Stogursey is to ring again. The bell hangs over the Almshouses founded by Sir William Poulet in the reign of Henry V. For 500 years it was rung daily at 6 a.m. and 6 p.m. Last year the eighty-year-old bellringer died and the bell was silent until another occupant has now been found for the bellringers' almshouse. The rope hangs down into the bedroom so that the ringer can do his work lying in bed!

OAK-APPLE DAY IN SOMERSET

By C. E. KILLE

THE Twenty-Ninth of May has little significance to the young folk of to-day; some of them may indeed be able to inform you that it commemorates the famous escape of King Charles, who concealed himself in an Oak Tree and eluded his pursuers. In our young days, however, this day was looked forward to as one of the events of the year in many villages. Early in the morning, or the evening before, lads and girls betook themselves to the woods and gathered sprays and branches of oak, taking care to reserve a special "button-hole," complete with oak-apple.

Monument to King Alfred, Athelney, Somerset.

Boughs of green oak decorated the doorways of the cottages, even the school porch being included in the scheme, and on coat or cap everyone sported a spray of leaves. Woe betide the luckless youngster who had omitted to provide himself with his button-hole, for with the innate cruelty of which only boys are capable, each of his mates would be armed with a formidable stinging-nettle, ready to administer that which sent him hurriedly hunting for dock-leaves!

As usual with these ancient customs, noontide broke the spell, and after twelve o'clock it was taboo for anyone to carry on with the game.

The Twenty-Ninth was "Club-Walking Day." All along the village street the "standings" appeared; they were there when we awoke from our slumbers—sprung up like mushrooms in a night!

Our weekly pence had been carefully saved for the occasion, for wonderful things were displayed on these stalls: brandy snaps, cakes moulded into shapes of figures and animals (judging by the taste, flour and water were the only ingredients), sticks of streaky toffee, huge heaps of bull's-eyes, and sugar-candy; here a cockle-stall, there a toy-seller, while on the village green were the usual coconut-shies, shooting-galleries, and other attractions.

I remember a man who got into a large barrel and, poking his head out of the top, invited the public to try their luck with short oaken staves, for which the price was "three shies a penny"; he was exceedingly agile, and dodged very cleverly, although the crowd did their level best, determined to get their money's worth. Had one of these heavy missiles scored a bull's-eye, he would probably have ceased to worry about the things of this world! The local police were of the same opinion and put an end to the game in its early stages. Another man allowed a heavy stone to be laid on his bare chest and cracked with a sledge-hammer; but perhaps the premier attraction was the performance of a quack dentist, a large man

with a goatee beard and a wonderful gift of oratory. His "operations" were performed on the top of a waggonette, across the dash-board of which were displayed a formidable array of instruments. As a preliminary to commencing business, he announced a great competition, and he soon gathered a large crowd around him.

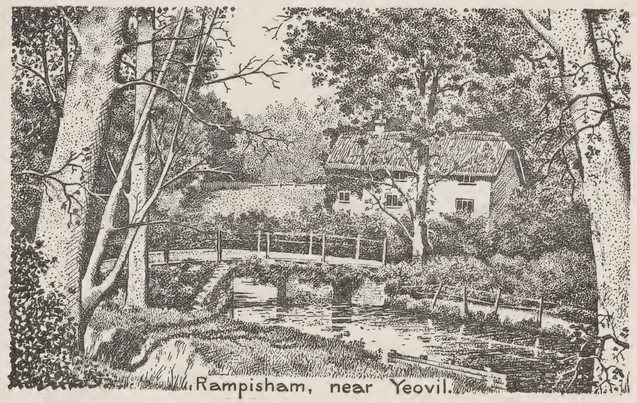
When a sufficient audience had collected, he beckoned to seven or eight small urchins, who were waiting in readiness. Setting them up in his conveyance in full view of the spectators, he gave each of them a huge peeled Spanish onion, and at a given word they started devouring them as if their very lives depended upon it; he who finished first was to receive the prize of one shilling!

With tears streaming down their faces, they struggled gamely through the task, amid shrieks of laughter from the crowd and a running fire of coarse but witty remarks from the promoter.

One boy finished his tasty meal in record time and won the coveted prize, while some of the others had thrown up the sponge half-way through. Far braver were the intrepid souls who later ascended the "scaffold" and had teeth extracted in circumstances that would have made a modern dental surgeon shudder, their convulsions, of course, evoking great merriment from the crowd, much as a public execution would have done a few decades earlier.

The principal event of the day was of course the "Club Walk"; a procession formed of the various friendly societies, headed by a brass band, often of the local volunteers; garlands of flowers and oak were carried on poles; a couple of "Chief Rangers" of the Foresters' Society rode on horseback, attired in green, carrying bows and hunting-horns. Preceded by their banners, the various clubs came in their order, each member wearing across his chest the broad riband of his Society, and stewards bore the Club staves with the brass tokens that are now so sought after by collectors.

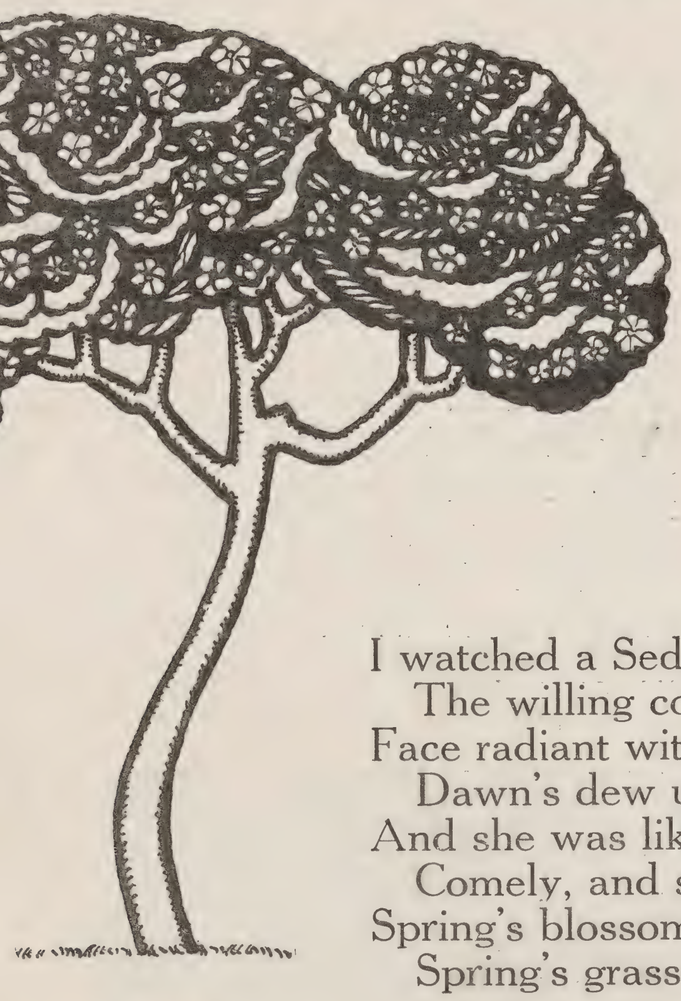
After a short service in the parish church, they marched to the village inn, where in the large assembly-room, invariably even now known as "The Club Room," a spread was set for them. Toasts were drunk and speeches were made before the company dispersed to join the revels.

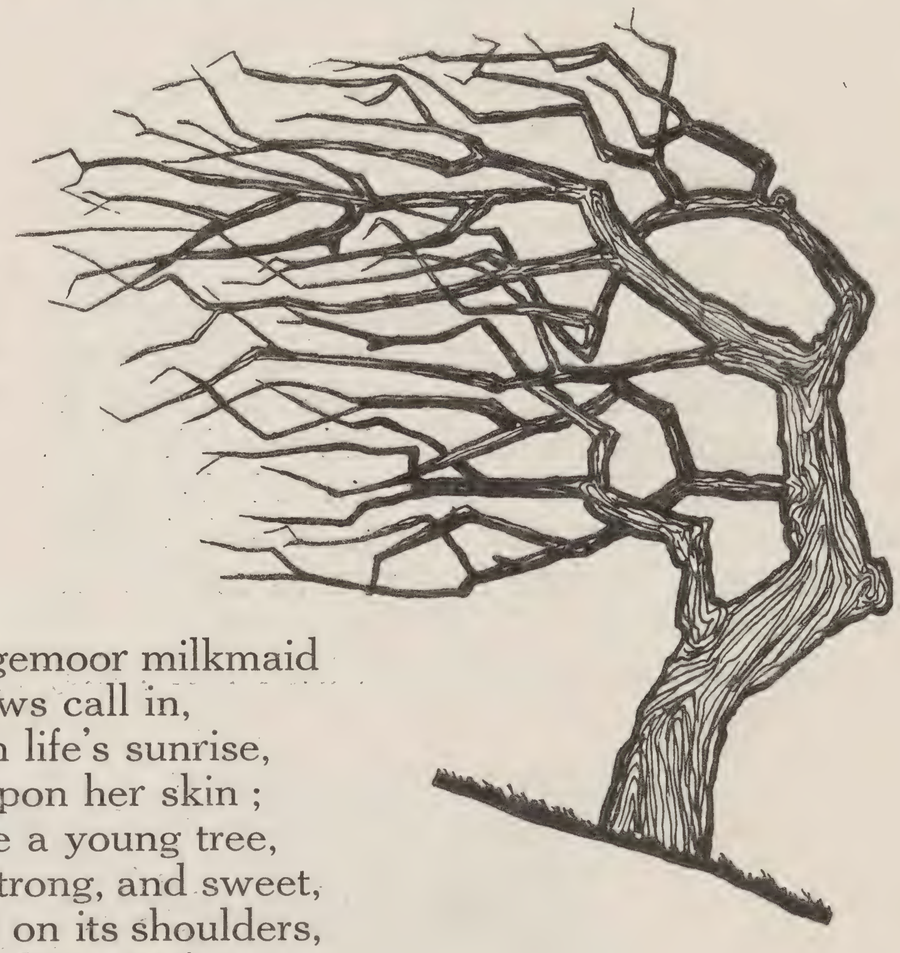


Rampisham, near Yeovil.

There are still a few villages in Somerset where the old custom survives, amongst which are Dulverton, Nether Stowey (where there is a famous women's club), and Timberscombe, the last named being the only place where the flower garlands are still carried. These garlands are wonderfully constructed and involve many hours of patient work; made of fresh blooms of every available species and colour, in which roses predominate, they often weigh as much as sixty to seventy pounds, and are carried sometimes for quite a few miles, for the procession does not fail to visit most of the "big houses" in the neighbourhood, where they are usually regaled with the time-honoured fare of "cakes and ale," after which "the squire," with a friend or two, judges the garlands and awards prizes for the best.

THE TWO TREES





I watched a Sedgemoor milkmaid
The willing cows call in,
Face radiant with life's sunrise,
Dawn's dew upon her skin ;
And she was like a young tree,
Comely, and strong, and sweet,
Spring's blossom on its shoulders,
Spring's grass about its feet.

I watched an Exmoor shepherd
Fold his soft flock at dark,
Scarred, twisted, weather-beaten,
Hands brown and gnarled as bark ;
And he was like an old tree
On his own storm-swept moor,
Bowed, buffeted by winter,
But sound wood to the core.

Green Sedgemoor, russet Exmoor—
Rooted in soils like these,
Men feed on the earth's virtues,
And so grow much like trees.
The rich land's richest harvest
In such folk still is borne—
A young maid like a fruit tree,
An old man like a thorn.

—Isabel Wyatt

BATH.

Bath—city of culture styled,
Hill-girthed, like a queen protected,
A jewel fashioned by a master artist,
With thy river thread of liquid silver.
Tradition-bound, aloof, perhaps disdainful
Like most fair women perfectly adorned.
How beautiful thou art !
Thy seasons come and go in quick succession
Vying with each other in pride of place.
Spring—flower-decked in fairy colouring,
Summer—radiant in riot of perfumed beauty,
Autumn—a masterpiece in cloth of gold,
Winter—pale mists of pearl and mystery.
Queen City of the West, how favoured thou !

—Anne Lyon Bamber

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"ONE OF THE GREAT CLASSICS OF GEOLOGICAL CARTOGRAPHY"—GEIKIE
FIRST GEOLOGICAL MAP OF ENGLAND AND WALES

350 **Smith** (William) A DELINEATION OF THE STRATA OF ENGLAND AND WALES WITH PART OF SCOTLAND; exhibiting the Collieries and Mines, the Marshes and Fen Lands Originally overflowed by the Sea, and the Varieties of Soil according to the Variations in the Substrata, Illustrated by the Most Descriptive Names by W. Smith . . . Aug.st. 1. 1815. [*London, J. Cary*, 1815]. Large Folio. A Colored Geological Map, 6 feet by 8½ feet, in 16 hand-colored sheets including the small-scale topographical index map which is often lacking. Modern boards, morocco back. Edges of some of the maps repaired and strengthened. EXCEEDINGLY FINE COPY. $3750.00

The first geological map of England and Wales published after 24 years of intense observation and study. It was the first attempt to portray on such a scale not merely the distribution, but the stratigraphy of the formations of a whole country. It demonstrates that England is regularly divided into strata, the order of which is never inverted and that the same species of fossils are found in the same stratum even at wide distances. Of special value and originality was his clear subdivision of what is now known as the Jurassic system.

William Smith (1769-1839), "Father of English geology," was by profession a land surveyor who in the course of his work became more and more interested in the great variety among soils. His first geological exploration took place in 1794. Smith was the first to recognize the importance of fossils in their full significance as a means of determining the relative age of strata.

In 1801 Smith's early observations were incorporated in a colored geological map of England and Wales, but the actual publication of this work was delayed for many years. "In 1814", Phillips states, "some portions of the Map were completely coloured", and on February 8, 1815, Smith submitted to the Society of Arts in London a completed copy, for which he was awarded the Society's premium. In the interim between completion and publication, Smith apparently continued to improve and correct his map. Mr. and Mrs. Eyles, in an interesting article which appeared in the *Annals of Science*, raised provocative points on the question of issues or states of the map. "Six more months elapsed before the map was actually published [Feb. 8-Aug. 1, 1815] and no doubt during this interval further copies were coloured. During the two and a half years that it took to complete the preparations for publication Smith continued . . . to add to his geological knowledge. It seems likely then that, from time to time, he would have wished to alter one or other of the sheets of his map because of new knowledge he had gained. We are thus presented with the possibility of the curious anomaly that several different issues of a map may have come into being before any one of them had been published." Our map corresponds to Eyles' Series II, which they designate as the first issue. Signed on Sheet 6 in ink "Wm. Smith No. 72."

On the maps the outcrops of the different geological formations are in most cases separated by a very fine broken engraved line. The colors were applied by hand. The maps are so large and the detail is so considerable that Phillips estimates that every copy would occupy a single colorist for at least one whole week.

V. A. Eyles and Mrs. J. M. Eyles, *On the Different Issues of the First Geological Map of England and Wales*. (In: ANNALS OF SCIENCE. 1938, v. 3, no. 2, 190-212). Geikie, *The Founders of Geology*, 381-396. Zittel, pp. 109-112. Mather & Mason, *A Source Book in Geology*, pp. 201-204. Horblit, *One Hundred Books Famous In Science:* No. 94.

347 **Vogdes** (Anthony Wayne) PALAEOZOIC CRUSTACEA . . . Transactions of the San Diego Society of Natural History, Vol. IV. *San Diego, California, Printed for the Society*, 1925. 8vo. 154 pp. With 2 plates. Library buckram, gilt on spine. Ex-lib., with library stamps, but a GOOD COPY. $5.00

348 **Weiss** (Christian E.) AUS DER FLORA DER STEINKOHLENFORMATION. Zur Erläuterung der wichtigeren Pflanzen dieser Formation, mit besonderer Berücksichtigung der Steinkohlengebiete in Preussen . . . *Berlin*, 1882. 8vo. 20 [1] pp. With 123 illustrations on 20 plates. Original cloth. Ownership inscription and library stamp. [SOLD]

Brit. Mus. (Nat. Hist.): V, 2288.

349 **Wilhelm** (Gottlieb Tobias) UNTERHALTUNGEN AUS DER NATURGESCHICHTE DER VÖGEL . . . *Augsburg, M. Engelbrechtische Kunsthandlung*, 1795. 2 vols. Small 8vo. In fours. With copper-engraved title-pages and 93 hand-colored plates (pl. IV lacking, but an unnumbered plate tipped in, p. 312; vol. II has 46 numbered plates, no. 44 repeated and 2 unnumbered plates tipped in). Half contemporary, gilt (worn, needs rebacking). Lightly foxed, marginal dampstain, but GOOD COPY with the bookplates of Dr. Charles A. Kofoid. 2 vols. $45.00

First Edition of the author's natural history of birds. These volumes of ornithology constituted Vols. IV and V of his encyclopedic series of 25 volumes covering zoology and botany, published at Augsburg, 1792-1828. These were all issued separately and in small sections. The present first edition is very scarce and is not recorded by Casey Wood, Brit. Mus. (Nat. Hist.) cat. or Graesse.
The charming plates, representing the birds described in their natural habitat, were copper engraved and colored by hand. Our copy has three additional plates, unknown to the usual authorities who record 90 plates in the rwo volumes.
Nissen, *Die Illustrierten Vogelbucher:* 988 (the complete series).

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Dear Sir

Send by same Post Day and Date
from the Bank for Half the Amount of
State you will make Draft also receive for
please inform them they may accordingly
your notice, Sample for your & the Seamstress
that you have sold Friends Apparel the work
with such the printing Matter Address may be
carried and got ready by Middle next Month
agreeable according to your Desire
with best remembrance I am Dear
Self Friends Sam Sr Yours
Truly Friend
Ch Lyon

Sir

According with the Mr Smith's Desire from your Letter
I have the Pleasure of sending the 2 Box of his State Pamphlet
by Express, I took some Pains to get it done sooner, but
the various persons engaged often interrupts our desired Speech
I expect the next Post will not be so long delay and am Sir
Your humble Servant & Friend

U. S. Ship Constitution off Port Mahon

Sir

Agreeable to Instructions from Rear Admiral Sir Richard Strachan Bart. Commander in Chief of His Majesty's Ships & Vessels employed in the Mediterranean I have to request you will proceed with the Constitution under your Command to Gibraltar Bay, and on your arrival there report yourself to Rear Admiral Sir Richard Strachan Bart. Commander in Chief of His Majesty's Ships & Vessels employed in the Mediterranean

You will receive herewith a Letter from the Secretary of the Navy of the United States, which you are to deliver to the Consul of the United States at Algiers, and on your arrival at that Port you will communicate with him, and deliver to him the Letters addressed to the Dey of Algiers, and to the Consul of the United States at that Port, and you will remain there with the Constitution under your Command, until the Consul shall have had an opportunity of communicating with the Dey, and shall have received his answer to the Letters delivered to him by you, unless you should sooner receive information that the Dey has declared War against the United States, in which case you will immediately return to Gibraltar Bay, and report yourself to Rear Admiral Sir Richard Strachan Bart. Commander in Chief of His Majesty's Ships & Vessels employed in the Mediterranean

If there is any of the Public Vessels of the United States under your Command, or employed in the Service of the United States, in the Mediterranean, you will communicate with the Commanding Officer of each, and direct him to remain with the Ship under his Command, until he receives your further Orders

I am Sir
Your obedient Servant
[illegible]